



VOL. XXX.

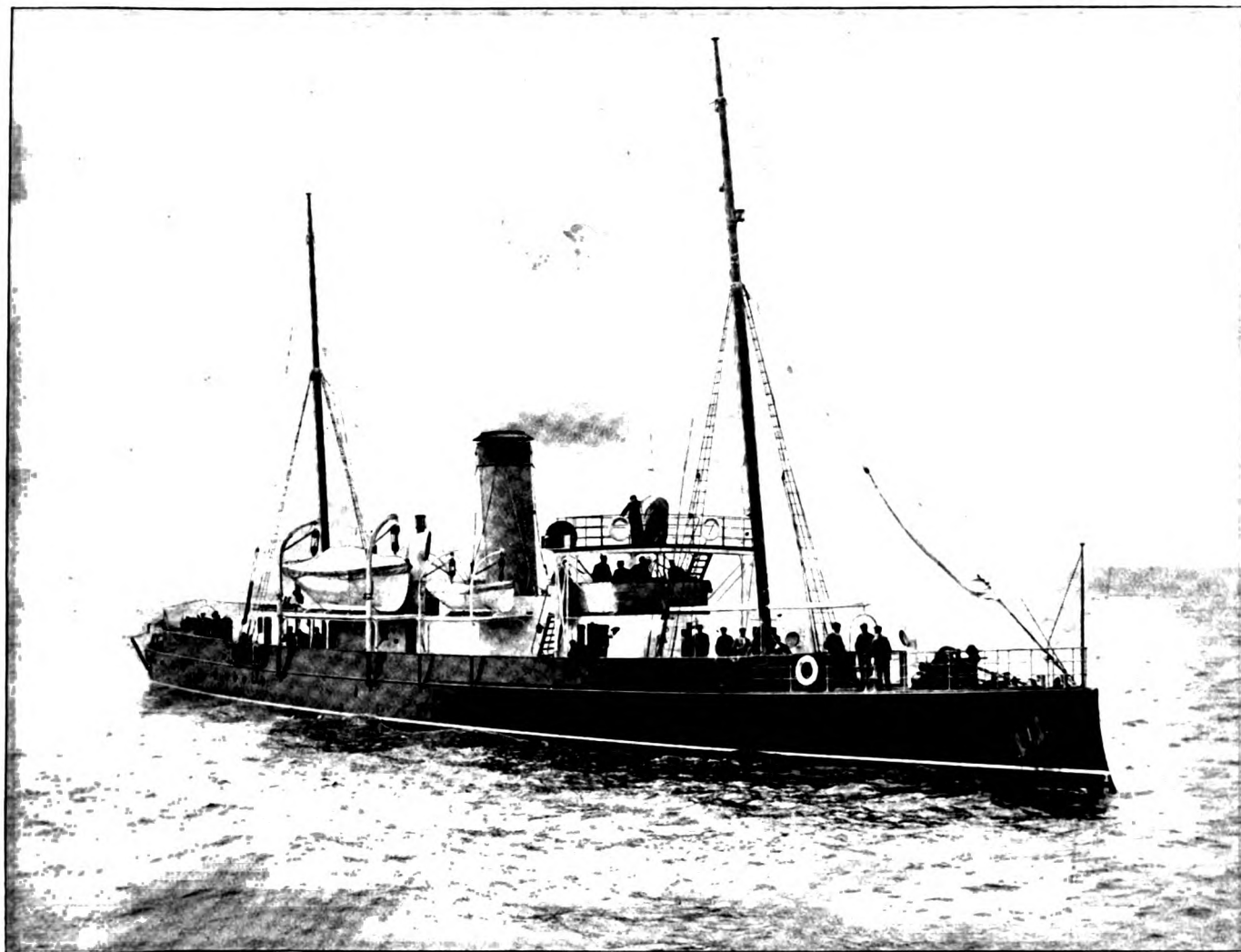
CLEVELAND, O., OCTOBER 27, 1904.

No. 17.

FISHERIES CRUISER CANADA

Herewith is given an illustration of the new cruiser Canada, built by Messrs. Vickers Sons & Maxim, Ltd., at their naval

ited dimensions in order to pass through the canals to the great lakes the Canada attained on trial the comparatively high speed of $17\frac{1}{4}$ knots. She is therefore faster than any



DOMINION FISHERIES CRUISER CANADA.

construction works at Barrow-in-Furness to the order of the Canadian government for the protection of the fisheries around the extensive seaboard of the Dominion. Although of lim-

ing tug on the lakes and will speedily overtake any fishing tug caught across the line. She mounts four guns so that with these two useful qualities she should be able to do

effective service in the work for which she was specially designed and constructed.

The following gives the principal dimensions:

Length between perpendiculars, 200 ft.; breadth molded, 25 ft.; depth, 14 ft.; armament, four rapid-fire guns; twin-screw, triple-expansion engines, cylinder diameters, 15 in., 23½ in. and 38 in.; stroke, 22 in.; two single-ended boilers; diameter, 12 ft. 9 in.; length, 10 ft. 9 in.; steam pressure on trial, 180 lbs.; vacuum on trial, 25 in.; revolutions on trial, 177; indicated horse power on trial, 1,800; mean speed of ship on trial, 17¼ knots.

The vessel has a smart appearance with more than a suggestion of strength, principally from her ram bow. Her large funnel, and the two fore and aft rigged masts with an appropriate rake give the vessel a well balanced appearance. There are two decks, together with a flying bridge. Accommodation is provided on the lower deck abaft the machinery spaces, for the officers, engineers, doctor, etc., with a large ward room, saloon, pantry, bath room, woman's closet, and storerooms. Rooms for the warrant and petty officers are also arranged on the lower deck. On the upper deck, aft, accommodation is provided in a large steel deckhouse for the captain, who has a separate day cabin, sleeping cabin and bath. Forward of the machinery spaces on the lower deck the crew have their mess and sleeping quarters. The vessel is well lighted and ventilated and is heated throughout by steam. The total complement, including officers and men, is about sixty.

The vessel is armed with four long range quick-firing guns mounted on the upper deck, two forward and two aft. The magazines are forward of the machinery space under the water line. Adjacent are the bread and provision rooms, fresh water tanks, etc. The vessel has a complete installation of auxiliary gear for accurate navigation, and to meet all emergencies. There is included a steam steering gear placed in the wheel-house on the upper deck with chains led aft to a quadrant on the rudder. The gear can also be controlled from the bridges. A steam windlass for working the anchors is placed on the upper deck forward. Two sets of electric engines and dynamos are fitted, and the vessel is lighted throughout with electric lamps. There is also a search light projector of great power.

The vessel is rigged as a fore-and-aft schooner, with two pole masts. She carries four boats, including a large steam launch.

The propelling machinery consists of two sets of inverted vertical triple-expansion engines, each set having three cylinders working on separate cranks. The diameter of the cylinders are as follows: High pressure, 15 in.; intermediate pressure, 23½ in.; low pressure, 38 in., the stroke in all cases being 22 in. The steam distribution valves are of the piston type for the high-pressure cylinders and of the flat form for the intermediate-pressure and low-pressure cylinders, actuated by valve gear of the double eccentric link motion type, with reversing gear of the "all round" steam and hand description. The condensers form part of the casting which constitutes the back columns of the main engines. The circulating water is supplied from centrifugal pumping engines fitted in duplicate for each condenser. Steam is supplied at a working pressure of 180 lbs. per square inch by two single-ended boilers, 12 ft. 9 in. diameter by 10 ft. 9 in. long, working under Howden's system of forced draft. In the stoke hold there is a See's ash ejector fitted for discharging ashes overboard, in addition to the hand ash hoists. The auxiliaries in the engine-room include one duplex pump for feeding boilers; one large duplex pump for fire, bilge, and wash-deck service, and for supplying ash ejectors; also one feed-water filter and one evaporator.

Thus, in every way, the vessel is "well found." The Canada left the Vickers company's works on Aug. 16, and is now in Canadian waters.

SHIP BUILDING IN THE UNITED KINGDOM.

From the returns compiled by Lloyds' Register of Shipping it appears that, excluding warships, there were 393 vessels of 1,046,308 tons gross under construction in the United Kingdom at the close of the quarter ending Sept. 30, 1904. The particulars of the vessels in question are as follows, similar details being given for the corresponding period in 1903 for the purpose of comparison:

DESCRIPTION.	30th Sept., 1904.		30th Sept., 1903.	
	No.	Gross Tonnage.	No.	Gross Tonnage.
STEAM.				
Steel.....	352	1,029,622	353	889,035
Iron.....	1	220	1	220
Wood and Composite.....				
Total.....	353	1,029,842	354	889,255
SAIL.				
Steel.....	26	14,855	21	15,609
Iron.....	14	1,611	18	1,744
Wood and Composite.....				
Total.....	40	16,466	39	17,353
Total Steam and Sail.....	393	1,046,308	393	906,608

The tonnage under construction is now about 53,000 tons more than it was at the end of June, 1904. Compared, however, with the total reached in September, 1901, which is the highest on record, the present figures show a reduction of 367,000 tons or 26 per cent.

Of the vessels under construction in the United Kingdom at the end of September, 301 of 764,170 tons are under the supervision of the surveyors of Lloyds register with a view to classification by that society. In addition fifty-three vessels of 136,966 tons are building abroad with a view to classification. The total building at the present time under the supervision of Lloyds register is thus 354 vessels of 901,145 tons.

A 30-FT. WATERWAY TO THE SEA

Maj. J. C. Sanford, government engineer at Philadelphia, announces that by the end of the year the Delaware river 30-ft. ship canal for a distance of 22½ miles from deep water in Delaware bed to Newcastle will be completed. Maj. Sanford adds further that if the next congress appropriates \$2,254,463 already authorized for the completion of the project he will finish the channel in the following eighteen months and give to Philadelphia a ship canal 30 ft. deep at mean low water and 600 ft. wide from the port to the ocean by June, 1906. Work on 12 miles of dredged channel from the bay to Reedy Island will be finished during November. From the latter point there is 2½ miles of deep water to Reedy Point and between that place and Fort Delaware the channel must be dredged 2½ miles, to do which the contractors have until the end of this year, but they hope to finish it by Dec. 1. This will complete 22½ miles for the channel constituting the first and second sections, as between Fort Delaware and New Castle there is 3½ miles of deep water which requires no dredging. Maj. Sanford says that the necessary new range lights have been finished and are ready for use so that this part of the 30-ft. channel can be navigated as soon as completed. Meanwhile the government is engaged in removing Schooner Ledge, the most dangerous obstruction in the channel, and this work Maj. Sanford also hopes to complete by June, 1906. Under his supervision also the government dredges Barnard and Gillespie are cleaning the channel through Cherry Island flats and this part of the channel is yet the shallowest in the river. The total cost of the project as authorized by congress is \$5,810,000 of which \$3,555,536 has already been appropriated.

The battleship *New Jersey* will be launched at the yard of the Fore River Ship Building Co., Quincy, Mass. on Nov. 10.

STEEL ABSOLUTE IN SHIP CONSTRUCTION

The report of Lloyd's Register of Shipping for the year ended June 30, 1904, contains a great deal of interesting information as to the operations of the society, and also affords striking evidence of the spirit of enterprise which characterizes ship owners in the conduct of their business, even under very discouraging circumstances. In view of the low freights which have ruled for a long time past, it might naturally have been expected that recent returns would have shown a very considerable falling off in the output of new ships. There is,

of the society has been sought, as usual, for vessels of distinctive design or intended for special purposes, including steamers burning liquid fuel, bulk-oil carriers, vessels for river traffic, yachts, dredges, etc.

Indeed the increasing tendency of ship owners in these days to build vessels of special types is clearly illustrated by the character of the work carried on under the supervision of Lloyd's Register. The society's rules for the construction of vessels allow ample discretion for dealing with vessels of all kinds, and the committee are always prepared to meet the



CUTTING AN OLD FRIEND.

indeed, as was inevitable, a decline from the record figures of recent years, but in the light of the depression in shipping the result of the year's working is on the whole a remarkable one. During the period which the report reviews, no less than 625 vessels of 1,079,000 tons have been built under the inspection of the surveyors to Lloyd's Register with a view to classification in Lloyd's Register Book, which is so well known to merchants, underwriters, and ship owners throughout the world.

In these figures are included, it is interesting to note, eight steamers over 9,000 tons each, and thirty-six over 5,000 tons each. Among the largest steamers are four for the Peninsular & Oriental Steam Navigation Co., two for the Union-Castle Mail Steamship Co., Ltd., one for the Cunard Steamship Co., Ltd., and one for the Pacific Mail Steamship Co.

The new tonnage classed was mainly composed of cargo and passenger vessels of familiar types, but the classification

exigencies of any trade so long as the vessels are fit for the purposes for which they are intended, and safety and efficiency are secured.

With the object of keeping the rules abreast of the best current knowledge, they are year by year brought under the review of a special technical committee representative of the ship builders and marine engineers of the country. Last year several subjects of importance were dealt with, including the rules for the construction of turret deck steamers, which were revised in accordance with the experience obtained in the working of vessels of this description.

That the committee's efforts are appreciated is shown by the fact that the aggregate measurement of the vessels at present holding the class of Lloyd's Register approaches 18,000,000 tons.

In addition to its functions as the premier classification society in the world Lloyd's Register performs other im-

portant duties, one of which is the fixing of load lines to vessels under the Merchant Shipping Act of 1894. The number of vessels to which load lines had been assigned up to the end of June, 1904, reached a total of 12,728. During the year, moreover, 655,000 tons of steel intended for use in ships and boilers were tested by the society's surveyors.

The operations of the society are directed by a large representative committee presided over by Sir John Glover, and the surveying duties are carried out by a staff of 293 officers stationed at all important shipping centers both at home and abroad.

As compared with the figures for the preceding twelve months the present return, following the general movement of the ship building industry, shows a decrease of 130,305 tons as regards steamers, and 41,070 tons as regards sailing vessels. It will be interesting to quote the figures representing the new tonnage classed by the society during recent years:—

	Steam.	Sail	Total
1894-5	766,114	55,253	821,367
1895-6	860,930	70,985	931,915
1896-7	798,488	62,129	860,617
1897-8	827,132	24,463	851,595
1898-9	1,352,329	20,357	1,322,686
1899-0	1,236,831	18,908	1,255,739
1900-1	1,328,395	26,916	1,355,311
1901-2	1,381,750	43,666	1,425,416
1902-3	1,182,265	68,155	1,250,420
1903-4	1,051,960	27,085	1,079,045

The relative extent of the employment of steel, iron and wood for ship building purposes in this country, is illustrated by the fact that about 99.82 per cent of the tonnage classed in 1903-04 was built of steel; .04 per cent of iron; and .14 per cent of wood.

A MERCHANT MARINE AND PROSPERITY

By Senator Chas. W. Fairbanks, Republican Candidate for Vice-President.

The importance of upbuilding the American merchant marine our statesmen have been foremost in keeping before the country. We have increased our foreign commerce in recent years to a high degree. Last year it reached \$2,450,000,000. It has not yet arrived at its maximum, and it is destined to increase far beyond its present proportions. This commerce will continue to grow, and we shall gain a still larger share of trade with European and oriental countries. While we are gratified with the growth of our foreign trade and with the prospect of its continued increase, we regret we are so dependent upon foreign ship owners for shipping facilities. We furnish the trade, and foreign capital and labor produce the ships with which to carry it. Only about 9 per cent of our commerce with other countries is carried in our own vessels and under the protection of our own flag. Nearly 91 per cent is carried in foreign bottoms, and we pay therefor upward of \$150,000,000 a year. This is certainly not good business judgment. There is something wrong about it. There is no good reason why the United States should be so entirely dependent upon foreign vessels for carrying its commerce. There is no good reason why we should not have a merchant marine sufficient to carry our fair share of the trade between the United States and all ports of the world. If we are to increase our foreign commerce we shall find it to our national interest to carry it more largely in vessels bearing American register.

* * *

A committee appointed at the suggestion of President Roosevelt to investigate this subject consists of ten able senators and representatives. They have been engaged since the adjournment of congress in exhaustive hearings upon the en-

tire subject. It is hoped that they may be able to place before the next congress and the country such facts and conclusions as will materially aid us in reaching a sound and patriotic conclusion on this great subject.

If we can build up a merchant marine we will increase opportunities for labor, stimulation to enterprise and prosperity to the American people.

LIVERPOOL SHIPPING LETTER

Liverpool, Oct. 17.—There has been no new development during the past week in the North Atlantic rate war, beyond the publication of an official statement by the White Star Line that the further reductions in the saloon fares of this line which I announced last week are but the usual winter reductions, ordinary summer fares of \$75 being brought down to \$60. This involves no new principle or departure in connection with the struggle between the Cunard and the continental lines. The position of the Cunard company seems to gain in strength as the struggle is prolonged. The rush of Hungarian emigrants, it is said, has now become so great that the Cunard Line has been compelled to add hastily another liner to its Fiume-New York service—namely, the steamer Carpathia, a vessel of 14,000 tons. Up to the present the service has been carried on by three steamers, and one of these, the Slavonia, when she cleared from Fiume last week, had 2,018 steerage and 44 saloon passengers on board. The applications for this sailing were so numerous that no fewer than 1,000 were unable to find accommodation and they had to be sent overland to Liverpool, whence they will reach their destination by the Umbria and Campania. The struggle is thought to be practically at an end as far as any further cutting of rates is concerned, and no doubt when the passenger season again comes round the fares will be raised to the level at which they stood before the cutting took place.

In the meantime not a little attention is being directed to the alterations being made by the International Mercantile Marine Co. According to a circular just issued the White Star Mediterranean service from America which has hitherto been confined to Boston, will be extended to New York, from which port the Cunard Line Mediterranean vessels sail. The arrangement is that the White Star liners shall sail alternately from Boston and New York, the vessels engaged being the Republic (which leaves New York on Oct. 20) the Cretic, Romanic, and Canopic. The Azores, Gibraltar, Algiers, Naples, Genoa, Alexandria and Palermo are the ports at which the steamers will call on their voyages and the circular further adds: "The attention of passengers holding return tickets by the White Star Line is especially drawn to the choice of route thus offered, return tickets being available for their full value towards passage by any of the White Star services. Facilities will be offered for booking by the most attractive route across the continent of Europe between the various ports of call in the Mediterranean and Liverpool, which will thus enable passengers to book the round trip from New York or Boston via the Mediterranean, returning from Liverpool or vice versa." On the other hand, the Philadelphia sailings of the American Line have been curtailed in consequence of the small passenger traffic and shortage of freight, many of the steamers having been sailing practically without cargo. There is also a feeling that the combine may reduce the sailings on the New York route, but for the present, at any rate, the passenger traffic from this port seems heavy enough to warrant all the sailings, although the season is so well advanced.

The White Star liner Cretic which sailed from Liverpool this week and will from Boston proceed to New York to enter the Mediterranean service, was in charge of Capt. Inman Sealby, previously of the same company's steamer Corinthic. Capt. Sealby, who succeeds Capt. James, now retired from the service, has been connected with the White Star Line for

a lengthy period, having been a commander of one of the old sailing vessels of the concern. Since then he has had a varied and valuable experience in steam craft, having been engaged in the Pacific, London-New Zealand and Liverpool-Australian services. The commander, who is still a young man, and full of vigor, is held in the highest esteem by all with whom he has come into contact.

The Cunard liner *Umbria*, which sailed from Liverpool for New York on Saturday, has been fitted with the Marconi long distance wireless telegraphy apparatus, which will enable her to pick up etheric messages when 1,500 or 1,600 miles from land. During her future voyages, therefore, passengers by this popular steamer will be kept posted as to the world's happenings during the whole extent of the Atlantic trip. The news messages which are dispatched from Poldhu, in Cornwall, and the United States, will be incorporated in the *Cunard Daily Bulletin*, a daily newspaper published on ship-board. With the fitting of the *Umbria*, the *Cunard Bulletin* will now be published daily on board the four mail steamers, *Campania*, *Lucania*, *Etruria* and *Umbria*. Originally, this paper was confined to four pages and was published once on the outward and once on the homeward voyage. Its present dimensions are twelve pages, and a further increase in size is contemplated. The *Bulletin* contains, in addition to the latest news dispatched by Marconigrams, illustrated articles, poetry, etc., and is much appreciated by passengers.

H. M. S. *Patrol*, the second of two fleet scouts building by Messrs. Cammell, Laird & Co., Ltd., was launched this week at the Birkenhead ship building yard. These scouts are designed to secure a speed of 25 knots on a prolonged trial, the following being the principal dimensions: Length, 370 ft.; beam, 38 ft. 6 in. The vessel will be propelled by two sets of four-cylinder, triple-expansion engines of 16,500 H. P., balanced on the Yarrow, Schlick and Tweedy system, steam being supplied by twelve water-tube boilers of the Laird type, arranged in three watertight compartments. A protective deck is worked throughout the ship, and the engines are protected by 2-in. specially treated Krupp non-cemented steel, made at the company's armor-plate works at Sheffield. The armament consists of ten 12-pounder quick-firing guns, three of which are mounted on the forecastle deck, three aft on the upper deck, and four on upper deck amidships. There are also eight 3-pounder quick-firing guns and two 18-in. torpedo tubes above water. When in commission the vessel will have a complement of 300 men.

Messrs. Ferguson Bros. of Port Glasgow have also launched this week a large twin-screw, barge-loading dredger for the Mersey Docks and Harbor Board. The vessel which was launched complete with steam up ready to start work, is one of the most powerful and deepest bucket ladder dredging machines that has been constructed. She is of the bow-well center bucket ladder barge-loading type, with a length of 207 ft., breadth 41 ft. depth 14 ft., propelling speed 8 knots, dredging capability 1,000 tons per hour from 56 ft. below water level. The new vessel was named *Vulcan*. The design, which embodies several special features, was prepared by the builders to meet the requirements of the Mersey Docks and Harbor Board for deep dredging on hard material, and for working close up to dock and quay walls. The vessel was built under the superintendence of Mr. A. G. Lyster, engineer-in-chief for the dock board.

The last departures of the season from Liverpool for the St. Lawrence are now announced. From Manchester the last sailing will be the *Manchester Trader* on Nov. 3, and from Liverpool the *Allan liner Tunisian* on the same date. So dull has been the present season's business that most lines interested in the trade are glad that it is at an end.

Salt shipments from the Mersey show that during September there has been a considerable falling off principally to Asia and British North America. The total shipments

amounted to 43,247 tons, compared with 54,578 tons in September, 1903. The exports to United States were 4,310 tons compared with 4,468 tons, and British North America 7,161 tons, compared with 9,334 tons in September last year. Increases amounting to 500 tons are, however, recorded to Central and South America.

The apple season is now in full swing, the arrivals in Liverpool from Canada and the United States being very considerable and the condition of the fruit is excellent. Many of the steamers arriving have from 10,000 to 15,000 bbls. on board, and other steamers are expected shortly with immense shipments. The prices realized have so far been low owing to the heavy home crop, but there is a tendency to an improvement.

There is just now taking place in Manchester and district an earnest effort to increase the direct imports of American cotton via the Manchester ship canal. At a meeting of cotton spinners on Friday convened by the Manchester Cotton Association, Ltd., a resolution was unanimously passed, which in effect impresses upon spinners the necessity and desirability in their own interests of insisting upon direct shipments by steamers to Manchester being made a condition in every contract when buying cotton which had to be imported. Mr. C. W. Macara, president of the Federation of Master Cotton Spinners' Association, said it was most desirable that the ship owners who had provided freight for the port of Manchester should have the fullest encouragement from the members of an industry which had benefited so largely, both directly and indirectly, by their enterprise. An ample supply of tonnage has previously been provided, but its continuance by the ship owners will depend upon the support afforded by spinners.

WITH AND WITHOUT MARCONI

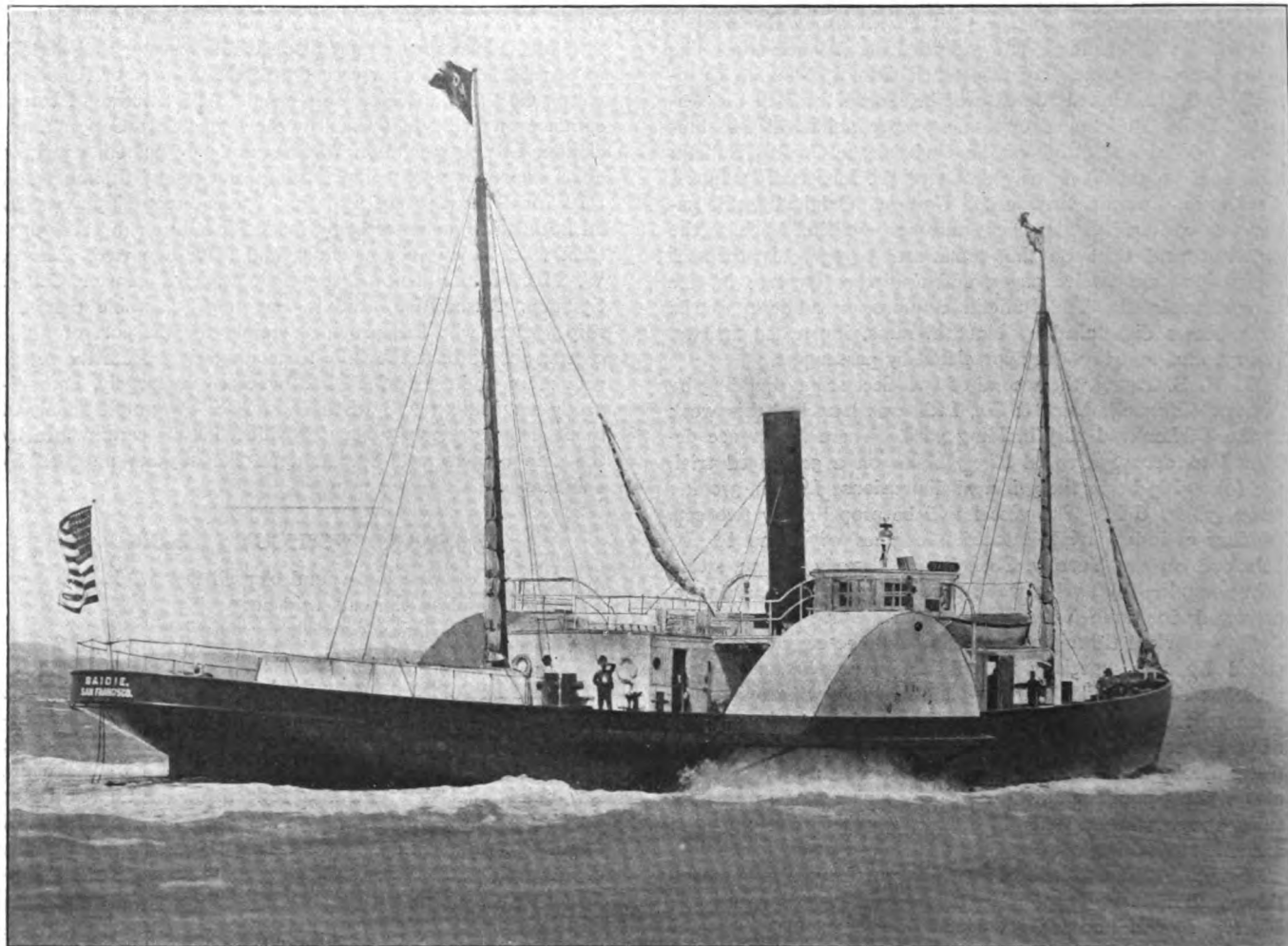
"I showed him round o'er all last week,
"And, at the end, said he:
"Mr. McAndrews, don't you think
"Steam spoils romance, at sea."

So said one of Kipling's chief engineer's after showing—no doubt with pride—a foppish nephew of the owner's "down below." We can imagine the old man's snort of indignation at the lack of appreciation on the part of the fop. There are few chiefs that don't make a visit below as impressive as possible to the visitor, so we can imagine, also, the feelings of this one. A remark somewhat similar made to me a few days ago, brought these lines to my mind as singularly appropriate. An English friend of mine, quite a traveler, speaking of his last trip across the Atlantic, said: "Yes, I am very fond of ocean traveling but do you know—since ships have been fitted out with this wireless telegraphy apparatus, a person hardly feels at sea at all. You haven't that feeling of being out on the ocean far from the maddening crowd." There was a lot more of this stuff, spoken in a tone of regret, and no doubt my friend felt much the same as the young fop afore-mentioned. It is a difficult matter trying to believe you are far at sea at the mercy of the elements, with the ticking of the Marconi apparatus in the operator's cabin sounding in your ears, and knowing that various items of news or gossip are passing, or perhaps a game of chess in progress between the passengers in your ship and another away somewhere on your beam. Or perhaps when you are well away from port, you meet an excited individual hunting up the operator to telegraph some information he forgot to leave in the hurry of departure. Well, I let my friend have his growl, and my reply was to tell him two little stories, as follows:

A number of years ago I was an engineer on a ship sailing out of England. She was just about the average, giving us our good times interposed with spells of hard luck. We were fairly regular in our arrivals at the home port, and as the ship was well equipped the folks ashore took it for granted

that nothing serious could ever happen to her. One stormy trip when homeward bound, while still in mid ocean, the motive power gave out. I won't go into details—sufficient to say we were hove-to for half a day making a temporary repair. When we did get her under way she moved along at a miserable crawl, barely making headway. But our work had just commenced, and for days we were doing eight hours on—four off, till at last she was making half speed. I make the remark here, that it was considered a big undertaking. To make a long story short, we arrived in port very much overdue, and were hailed as risen from the dead. I had some

answered with our signal, and listened attentively as her message came back, telling us she was lying disabled somewhere on our port-bow—temporary repairs being made—no assistance necessary and no danger. It was calm summer weather, and our course was altered slightly to take us close to the "Kohinoor." Presently, as we bowled along, she loomed up over the horizon and we were soon abreast of her as she lay rolling lazily on the swell. Helpless she certainly looked, her decks crowded with passengers who were intently studying us as we were them. They did not seem to be in any high state of excitement, as no doubt our close proximity gave



SIDE-WHEEL STEAMER SADIE WRECKED OFF NOME COAST.

newspapers handed me in which I read that vessel after vessel arrived in port all having the same tidings—they had come our way, but had seen no sign of our ship. I don't doubt for a moment that some of them had passed quite close to our ship, but as it was dirty weather had failed to see our lights. Of course, we knew we were safe enough but what of the feelings of our folks ashore as days passed with no tidings, the headlines in the newspapers getting larger, and insurance rates raised. We had no wireless telegraphy then, or the anxiety could have been greatly alleviated at least, as we would probably have spoken some ship in the time, and forwarded a report on the cause of our delay.

Not so long ago, on another ship I was on, I saw a case in which the possibilities of wireless telegraphy were demonstrated. One afternoon the operator stood at the table and his face wore a puzzled expression. To the tick-ticking of his machine he was spelling out the signal name of some ship in communication. "What!" he exclaimed, "the 'Kohinoor' why, she ought to be about three hundred miles ahead of us!" He

them a feeling of security. As we steamed past her, the smoke commenced to roll from her funnels, telling us they were getting up steam; and on looking astern a few minutes later the foam from her bows showed she was again under way.

If she had had a total collapse or lost her propeller, and drifted slightly out of the track, with no Marconi apparatus on board, we—and no doubt others,—could have passed her and been no wiser. My romantic friend said: "By George—yes—I hadn't thought of that!"

X. Y. Z.

SIDE-WHEEL STEAMER SADIE

The side-wheel steamer Sadie, which was wrecked on the Nome coast during the early part of September, was built by the Union Iron Works of San Francisco in 1898. The Sadie was of peculiar construction and appearance and was built for work in very shallow water. She was 157 ft. 6 in. over all, 30 ft. beam and 8 ft. molded depth. She was fitted with a compound engine 16 and 32 by 60 in., making 34 rev-

olutions at 160 lbs. steam pressure. Steam was furnished by two locomotive boilers 4 ft. 6 in. diameter by 18 ft. long. The Sadie was owned by the Alaska Commercial Co. and was employed as a cargo and freight boat to ply between steamers lying at anchor off the shore at St. Michaels and around the mouth of Candle creek and the Yukon river. The shallow nature of the water at these places prevents deep draught vessels from discharging their cargoes directly upon the docks.

DEVELOPMENT OF TRAFFIC ON WATERWAYS

Col. Edward P. North, member of the American Society of Civil Engineers, read a paper before the International Engineering Congress at St. Louis recently upon the subject "Development of Traffic on Improved Waterways and on Railroads." It was an important subject most interestingly handled. He said:

Although there is a general, if not exact, knowledge that the average yield of wheat per acre in the United States (13 bu.) is only about 43 per cent of the yield in the United Kingdom, decidedly less than half the yield of Holland and Belgium, 61 per cent of the German yield, and 71 per cent of that of France, the assertion is so constantly made that the phenomenal prosperity of this country is due to its superior fertility and unequalled natural advantages that there is a nearly universal acceptance of this untrustworthy statement as to fertility. Our natural advantages are not sufficiently greater than those of our neighbors to explain our superior prosperity, although the possession of a large area of from cheap to free land has undoubtedly been an important factor in our increased population and wealth.

In one great source of national wealth, however, namely, cost of transportation, which is not a natural product, the United States has undisputed advantage over all other countries. Shortly before his death Mulhall said that the average rate received by railroads of different countries for transporting a ton of freight one mile was, reduced to cents: United Kingdom, 2.80; Italy, 2.50; Russia, 2.40; France, 2.20; Germany, 1.64; Belgium, 1.60; Holland, 1.56; the United States, 0.8. Acceptance of this statistician's figures as approximately correct will immediately show that our low cost of international transportation has probably been the principal cause of our augmented wealth; an augmentation that was greater in the decade ending with 1900 than during the eighty years preceding 1870. For, not only does a low freight rate allow more to be divided between producer and consumer, but it has a more potent effect in inviting the production of commodities which, with higher freight charges, could not reach consumers; thus adding greatly to the employment offered to labor and capital.

There is no doubt that our railroad freight rates are the lowest in the world, and this is probably true also of our coastwise freight rates. Nor is there reason to doubt that the low cost of assembling and distributing our commodities has had an important influence on their production and consumption. It is noticeable that we have reached this distinctive position as transporters with the highest wages paid for labor known, and until lately with a higher cost for materials than our neighbors and competitors. But both the high wages and high prices have, by stimulating production and consumption, added to the volume of freight moved and reduced its cost.

Since our organization as a nation we have been pre-eminent for the energy and persistence with which we have developed and improved such aid to our wealth as is offered by water transportation. Improvement of the Mohawk west of the Schenectady, the precursor of the Erie canal, commenced with the adoption of our constitution, and concurrently the navigation of many streams falling into the Atlantic was improved and extended. Our canal-building era

was virtually inaugurated by the building of the Erie canal connecting the navigable waters of the Hudson river with all of our great lakes under legislation by the state of New York in 1816. The great influence of this canal after its completion in 1825, with its branches, on land values, and its success as a channel for transportation, led not only to more or less successful efforts to connect the James, the Potomac, the Delaware and the lakes above Niagara with the affluents of the Mississippi, and to many less important projects, but also to such an enlargement of the Erie canal, authorized in 1835, that the burden of boats could be increased from 40 to 240 tons.

Excepting a few instances, and then but for a short time, the rivers, harbors and canals improved and built by our government have been absolutely free from charges for their use. While a large proportion of the money expended for improvements has gone to important centers and the main lines of distribution, minor streams and small harbors have not been neglected, as advised by many who vainly endeavored to direct public opinion. On the contrary, they have secured about their full share of consideration and the country has not been robbed by the city, to the loss of both. Our trunk line railroad building was inaugurated consequent on "a meeting of a number of citizens to take into consideration the best means of restoring to the city of Baltimore that portion of the western trade which has lately been diverted from it by the introduction of steam navigation and by other causes," held in the city of Baltimore, Feb. 12, 1827. This meeting resulted in a charter for building a railroad from Baltimore to the Ohio river. At substantially the same time, May, 1828, congress appropriated \$1,000,000 in aid of the Chesapeake and Ohio canal, which was also to connect the waters of Chesapeake bay with the Ohio. The Hudson and Mohawk railroad, which has developed into the New York Central & Hudson River railroad, was built to abridge the delay to canal traffic caused by the twenty-two locks between the Hudson river and the Schenectady level of the Erie canal. The Boston & Albany was built to divert trade at the eastern terminus of the Erie canal from New York to Boston. The South Carolina road was projected to connect the harbor of Charleston with the Ohio at Cincinnati.

The government of the United States gave a great impetus to railroad building by its legislation of Sept. 20, 1850, giving to a trunk line railroad between Lake Michigan and the Gulf of Mexico substantially six square miles of land for each linear mile built. This aid was so continued that every state and territory west of the Mississippi and five states east of it, namely, Alabama, Illinois, Mississippi, Michigan and Wisconsin, are indebted to land grants, in a greater or less degree, for their transportation facilities. In aid of the Texas Pacific the land grant was 40 square miles, through the territories, per mile of road. The Union and Central Pacific railroads, with some of their branches, in addition to a land grant of 20 square miles per mile of road, amounting to nearly 32,000,000 acres, secured a loan of government 6 per cent 30-year bonds, varying with the difficulty of construction from \$16,000 and \$32,000 to \$48,000 per mile. This loan was in the aggregate \$62,652,952, of which the Union Pacific received \$27,236,172 and the Central Pacific received \$25,885,120. These loans were repaid with outstanding interest in or about 1898, excepting a small default on the part of one of the branch roads. This combined aid was sufficient to induce the Union Pacific to build 535 miles in one year and twenty days.

The British government, according to the report of a "Committee on Contract Packets" made in 1853, subsidized its main lines of steamers "to afford a rapid, frequent and punctual communication with those distant ports which feed the main arteries of British commerce, etc.;" refusing aid to, if not oppressing, internal communication. On the other hand, the government of the United States, and also individual states, counties and localities, subsidized its turnpikes, water-

courses and railroads almost entirely for the improvement of internal communications and neglected or oppressed our efforts to reach distant ports. England is pre-eminent as a ship building and ship sailing country, but its people pay the highest internal freight rates known. America now has a contemptible merchant marine, but its internal freight is handled at a rate unapproached in other countries. If, as has been lately urged, our government was unable to develop at one time both foreign and internal communications, it has apparently adopted the most profitable alternative, though our annual payments to foreigners for over-sea freights are said to exceed the receipts from either customs dues or internal revenue tax.

As the natural depth at most harbors on the great lakes was about 6 ft. and not more than 8 ft. could be carried over the St. Clair flats, above Detroit, a large traffic would be impossible without the increased depths made by the expenditures authorized by the various river and harbor bills. The first appropriation, 1823, was for the harbor of Erie. Ohio followed in 1825 with appropriations for Cleveland and Fairport. Buffalo did not get an appropriation from the general government until 1826. Chicago in 1833 and the St. Clair flats received its first appropriation, \$20,000, in 1852.

In the last mentioned year congress gave the state of Michigan 750,000 acres of public land in aid of a canal connecting Lake Superior with Michigan, Huron and Erie. This canal, built for the state by an incorporated company to which the land was transferred, was opened June 18, 1855, with two locks of 9 ft. lift, each 350 by 70 by 11½ to 12 ft., to overcome the 18 ft. difference of level at the Falls of St. Mary, or, as is generally known, the "Soo." The general government took over this canal from the state of Michigan, June 9, 1881, and completed the Weitzel lock, 515 by 80 by 17 ft., Sept. 1, 1881, and the Poe lock, 800 by 100 by 22 ft., Aug. 3, 1896. The Canadian government had in the meantime built a lock 900 by 60 by 22 ft., opened Sept. 9, 1895. These figures are from the statistical report on lake commerce, 1903. Since 1880 the traffic through both the American and Canadian locks has been free.

As only 41½ of the 958¼ statute miles between Duluth and Buffalo have required improvement to accommodate vessels of 20-ft. draught, and the same improvement has sufficed for the 885 miles between Chicago and Buffalo, the combined traffic on these routes being without an equal in any other channel, no other improvement undertaken by our government has had so beneficent an effect on our national wealth, nor, it is possible, has returned so large a dividend on the money expended.

The United States possesses no noticeable superiority in natural resources and is handicapped by the necessity of finding money to do in a part of a century that for which other countries have taken nearly a thousand years. It has in the aggregate exhibited a superiority in general honesty of purpose and in the broadmindedness of its legislators, both national and local. It is largely through legislation, notably and peculiarly in its help to all schemes for increasing wealth by diminishing the cost of interchange between producers and consumers, that this country has attained its superiority. From the fairly equal distribution of subsidies and direct payments between waterways and railroads there has issued a system of mutually beneficent rivalry, in that the railroads often own boat lines and the boat lines have owned railroads, which has given a higher remuneration to the producer and a lower cost to the consumer than would have been possible under any other system.

Lieut. Col. Charles Davis, with headquarters at Detroit, will open bids on Nov. 26 for the construction of a steel tug for use in St. Mary's river. The tug will be 62 ft. keel, 15 ft. beam and 8 ft. deep. The boat is to be used for general inspection work by Col. Davis and his assistants.

HOW TO STOP PRIMING

Editor Marine Review: The letter from X. Y. Z. in a recent issue reminds me of an experience of my own. I was third engineer of the steamship *Maple Branch*. I was very young and very green at the time. She was on her maiden trip to Karachi. I had had about three months sea experience in a small compound job of 120 H. P.—working pressure 50 lbs. but the *Maple Branch* was a "triple" job 150 lbs. pressure and I was decidedly in awe of this enormous pressure. One day in the mess room (the donkeyman used to take all the reliefs) the subject of priming came up. I had never had any experience with priming, but the chief told yarn after yarn about the terrible results he had heard of and experienced from priming. These stories preyed upon my mind and when I turned in that night, it was only to toss restlessly about dreaming of priming boilers and burst cylinders. I had the 12 to 4 watch usually allotted to the third in British ships. At 12 midnight I went below. There was a long swell on at the time, the sky had clouded over and it looked as if the weather were going to be bad. I felt round and the chief went up to his room which was on deck just across the alleyway opposite the engine room. No sooner was the chief gone than the stories told me the day before began to get on my nerves. Suddenly at 1:30 A. M. there was a loud bang. The blood froze in my veins, I looked up quickly at the water gages. There was no sign of priming there. The water surged lazily up and down in the glasses with the heaving of the ship. I had almost recovered my nerve again when there was another bang this time louder than before. I was all alone in the engine room and I hadn't the faintest idea what to do so I stuck my head in the stoke hold and called my fireman. He had been years at sea and I had heard him say he had been donkeyman. He no sooner got to the door than there was another loud bang.

"What do you think that noise is Hanlon?"

"It sounds like as if she was primin' sir."

"What's the best thing to do?"

"Oh shut your throttle a bit and I'll let the steam go back a little."

So I shut the throttle a bit and he let the steam go back, but without result. The banging becoming more frequent and violent at last I could stand it no longer, so calling Hanlon to stand by the engines I darted up the engine room ladder to tell the chief.

"Mr. Morrison she's priming terribly" said I.

"How do you know?" said he.

"Oh every now and again she gives a series of terrible bangs as if she were going to burst the cylinders."

"Is there any signs of foaming in the gage glasses?"

"No sir."

"What have you done to stop it?"

"I've let the steam pressure drop and shut the throttle a little. Is there anything else you would advise me to do, sir?"

"Yes. Hook back the engine room door."

And as if to emphasize his words the steel engine room door swung, by the motion of the ship, with a loud bang against its steel frame.

E. A. SUVERKROP.

The four-masted schooner *Catherine M Monahan* was launched last week from the McDonald ship yard at Mystic, Conn. The schooner is 170 ft. long, 38 ft. beam and 18 ft. deep. She will engage in the coastwise trade and be chiefly used in the transportation of lumber.

The Gas Engine & Power Co. and Charles L Seabury & Co., Consolidated, Morris Heights, New York, have received an order from Alfred Marshall for a new steam yacht of composite construction, 131 ft. over all, 109 ft. on the water line, 17 ft. beam and 6 ft. 5 in. draught.

DETROIT RIVER CAR FERRY SERVICE

Year by year winter navigation on the great lakes and their connecting channels is being extended, chiefly by the railroads, with many of which a water route or transfer of greater or less length forms an indispensable link in their system. The crossing of the Detroit river is the oldest of all these transfers and is by no means the least difficult. Although in some years little or no obstacle in the form of ice is met with, in others the keeping open of the Detroit crossing is a huge undertaking, in fact one upon which the very life of the railroads depend and immense sums have been spent in providing and operating ice crushing car ferries for the service. Last winter the channel was blocked solidly for sixty-five consecutive days, the longest period in the history of the transfer service, but in spite of this the Michigan Central railroad kept its trains moving as nearly on time as any other road anywhere in the country. It is impossible to convey to any one not familiar with the conditions an adequate idea of the almost superhuman efforts necessarily put forth to accomplish this. The blockading of the Detroit river is caused by ice formed in Lake St. Clair and carried down by the winds and current. Below the city the river channel is divided by a number of islands which arrest the flow of ice and it gradually bridges and backs up. At intervals the pressure of the current above starts the jam moving and it will move down a mile or two, the thickness of the bridge continually increasing until it has frequently reached a depth of 15 to 20 ft. at the lower end and in some places actually grounded. Finally the ice steps moving altogether and if there were no other disturbing conditions the problem would be an easy one because the transfer steamers, having once broken a crossing, could keep it open without difficulty. But the various ferry systems intersect each other's routes so as to continually dislodge and disturb the ice bridge and the pressure of the current then constantly tends to keep the lowest crossing closed up so that instead of a broken track the lower ferries (in this case the Michigan Central) must continually break a fresh crossing.

The Michigan Central transfer service consists of the transports Michigan Central and Transfer—all steel, paddle steamers, the latter in addition being fitted with a screw. For the Detroit river service the paddle has demonstrated its superiority owing to its ability to keep the sides of the ship clear and wash out the slips and, strange as it may seem, breakage is almost unknown, the Transfer, for instance, never having lost a bucket in fifteen years of service. The latter has the distinction of never having been stuck so as to be unable to extricate herself, the only transfer steamer on the river of which it can be said. She was built at Cleveland in 1889 from designs furnished by the Michigan Central Co. and resembles the other two steamers in most respects. The addition of the screw, however, (which is only used in heavy ice) makes it possible to swing the ship whether in motion or not and is the key to her success.

The ship is 285 ft. long, 45 ft. molded beam, 73 ft. beam over guards, 16½ ft. deep. Her paddles were each driven independently by a pair of horizontal 28 in. by 48 in. simple condensing engines, geared to the paddle shaft. The screw was driven by a pair of 28 in. by 36 in. simple condensing engines direct coupled.

The condensing apparatus for the paddle engines is independent and common to both, that for the screw engine is attached. The only drawback the Transfer has suffered has been a deficiency of boiler capacity for heavy ice work when all engines are working together. During the past summer the ship has undergone a thorough overhauling including the fitting of a new stern post, stern tube and shaft and propeller, all broken in the heavy ice of the past winter.

The problem of increasing her steam making capacity and if possible her power also was grappled with and the Great

Lakes Engineering Works of Detroit was consulted. Compounding the existing engines suggested itself naturally as satisfying one demand but this brought with it other and complex problems. To use the existing cylinders as high-pressure cylinders adding low-pressure cylinders tandem would have increased the working strains and power to a point that the shafts and gears and other parts would not carry and to reduce them meant that with the paddles jammed with ice it might be difficult to start the engines. It was finally decided to reduce the 28-in. cylinders to 22 in. and add 40-in. low-pressure cylinders tandem and provide an automatic bypass arrangement for admitting steam to low-pressure receivers for starting in ice. The initial working strains were increased about 10 per cent with a resulting increase in power of about 25 per cent to 30 per cent. The results have been even better than was expected and Mr. Henry Penton, the chief engineer of the Great Lakes company, under whose designs the work was carried out, is much gratified with the showing, as are Capt. J. R. Innes, superintendent of ferries, and Chief Engineer Westaway of the transfer service. Where three boilers were formerly used in regular service two are now found ample and the revolutions are much increased.

The screw engine was also converted into a cross-compound by the removal of one old cylinder and the substitution of a new low-pressure cylinder. Steam reversing gear was substituted for hand gear on all engines. Of course the true test will come with the heavy ice, but there is no doubt that the Transfer will improve even her own excellent record. It should be added that to meet such conditions as existed last winter and the winter before when coal was almost unobtainable and any grade, however poor, was welcome, a system of mechanical draft has also been installed, which will enable the use of inferior fuel.

The new transfer steamer Detroit approaching completion at the yard of the Great Lakes company, with her four screws and independent engines will be somewhat of an experiment and her work in the ice will be watched with interest. The type, it should be said, was not selected because of any belief in its superiority to the paddle, but because the increased loads to be carried, with consequent increase of beam, made paddles impossible with the present ships. The Michigan Central is determined evidently that it shall not be found wanting either by a bad winter or a rush of business.

Col. Thomas W. Symons, member of the Erie canal advisory commission, says that bids will be called for soon for the construction work upon the Erie canal on eight or nine different points at the east end of the state. The bids will be for excavation work which will cost about \$1,000,000 at each point. The object in letting a number of contracts at this time is to learn whether the bids will come within the estimates already prepared. Col. Symons adds that the \$101,000,000 appropriated for the enlargement of the canal is merely a nominal figure. The exact cost of the canal cannot be determined until experiments costing something like \$9,000,000 have been made.

Leatham & Smith, Sturgeon Bay, Wis., report that their steam barge Hurd picked up about fifteen miles off Cleveland a sailing boat about 18 ft. long, painted white, and with the name Vim in gilt letters on the bow. The sails were down and furled and a piece of line was hanging from the bow. It looked as though the boat had broken away from her anchorage. She was taken to Sturgeon Bay.

Fire this week destroyed one of the boiler houses of one of the portable machines at Ashtabula and the heat caused two of the hoisting and conveying rigs to collapse, they in falling damaging others. The loss will run into the thousands besides occasioning an expensive delay.



DEVOTED TO EVERYTHING AND EVERY INTEREST CONNECTED
OR ASSOCIATED WITH MARINE MATTERS
ON THE FACE OF THE EARTH.

Published every Thursday by

The Penton Publishing Company,

CLEVELAND, OHIO.

CLEVELAND: WADE BUILDING.
CHICAGO: MONADNOCK BUILDING.
DETROIT: HAMMOND BUILDING.
NEW YORK: 150 NASSAU STREET.

*Correspondence on Marine Engineering, Ship Building and
Shipping Subjects Solicited.*

Subscription, \$3.00 per annum. To Foreign Countries, \$4.50.
Subscribers can have addresses changed at will.

The Cleveland News Co. will supply the trade with the MARINE REVIEW
through the regular channels of the American News Co.

Entered at the Post Office at Cleveland, Ohio, as
Second Class Matter.

OCT. 27, 1904.

It seems incredible, and yet the figures prove it to be true, that the average cargo carried on the great lakes ten years ago was 2,500 tons and that the largest cargo carried on the lakes as late as ten years ago was 3,355 tons. Now the situation has changed so suddenly as to practically stagger one's understanding and it must certainly be giving the owners of what were the largest carriers on the lakes ten years ago considerable concern. The thing almost seems to have occurred in a night. The average cargo of the vessels under construction today is 9,000 tons, and the Steel Corporation, the largest shipper and ship owner on the great lakes, has let contract for four vessels of 10,000 tons capacity as the forerunners in the modernizing of its great fleet. It is going to dispose of its smaller vessels, probably to scrap them if it cannot sell them. Reference to another column in this issue will show what the vessels of the Steel Corporation are and their average carrying capacity.

It seems that the 10,000-ton ship, considered as too big for the lakes even as late as a few months ago, has really come to stay and is to be the carrier of the future. While actual figures are not as yet obtainable the added cost of operating a 10,000-ton ship as against a 4,000-ton ship is slight, whereas the gross earning power at an equivalent rate of freight is more than double. There is, of course, to be considered the in-

terest on capital and the delay at receiving ports which cannot handle these monsters with quite the dispatch that a smaller vessel is handled, but nevertheless the odds are with the big ship. It would not be surprising if the Steel Corporation had twenty such ships on the great lakes within the next five years.

In this connection it is quite interesting to recall the past. The statistics kept by the superintendent of the canal at Sault Ste. Marie is taken as the base for the following calculations. In 1856 the largest cargo of ore carried on the great lakes was 400 tons; five years later, in 1861 it was 460 tons; in 1866, 697 tons; in 1871, 1,148 tons; in 1876, 1,360 tons; in 1881, 1,484 tons from which time the record has been as follows:

Year.	Name of steamer.	Largest cargo carried Gross tons.
1882	Specular	1,604
1883	Onoko	2,324
1884	Specular	2,128
1885	Golden Age	2,254
1886	Onoko	2,450
1887	Onoko	2,595
1888	Onoko	2,483
1889	John Mitchell	2,599
1890	Barge 107	2,744
1891	E. C. Pope	2,954
1892	Maritana	3,133
1893	Selwyn Eddy	3,226
1894	S. S. Curry	3,355
1895	Aurania	3,843
1896	Aurania	5,119
1897	Amazon	5,464
1898	John A. Roebling	6,860
1899	John Smeaton	7,296
1900	John W. Gates	7,405
1901	Manila	7,252
1902	John Smeaton	7,425
1903	Wm. Edenborn	7,800
1904	Augustus B. Wolvin	10,300

President William Livingstone of the Lake Carriers Association is fond of telling a story that he would as lief be presented with an elephant as with a 2,000-ton ship. He will probably have to revise his figures somewhat now. All things conspire to favor the big ship. The constant deepening of the channels of the great lakes is of no advantage to the moderate sized steamer whose natural draught is not over 15 to 16 ft. Every added inch of draught is exclusively the property of the larger carrier and the minimum draught on the lakes may now be regarded as 19 ft.

There is one feature of lake trade, however, which has not kept pace with the deepening of the channels or the development of the ship and that feature is the dock equipment at the receiving ports. In fact vessel owners have manifested far greater willingness to conform to conditions than have the dock companies for all these departures that have recently been made have been to facilitate the existing unloading

equipment. In other words, instead of the equipment meeting the ship the ship has literally met the equipment. Nor is the volume of ore that is transported on the great lakes measured by the capacity of the ships to carry it. It is really measured by the equipment at the docks to handle it. Congestion at unloading ports is a frequent occurrence. It is estimated that the existing fleet on the great lakes could readily handle 40,000,000 tons of ore per annum were it possible to discharge their cargoes without delay.

The energy and enterprise of vessel owners in placing upon the lakes these mammoth freighters must inevitably force the cities along the south shore of Lake Erie to improve their harbors and the dock companies to add to their equipment. This is imperatively so because the new fleet of vessels now coming into existence will be unable to visit some of the ports owing to the fact that they cannot possibly reach the docks. There must, therefore, follow as a natural result the expenditure of great sums of money to render port facilities adequate to meet new conditions.

Indeed the new era is full of problems but it must be set down as part of the economic evolution of the times. It is quite clear that the ore trade belongs to the great carrier. It is not likely that any ships less than 500 ft. in length will be built for this trade in the future. The problem is to find something for the small class of carriers already in existence to do. The natural wastage of the elements will in course of time carry away all existing wooden tonnage. As the life of wooden ships go most of them are now old. The real problem is with the excellent but small-sized steel carriers now on the lakes. Their salvation must rest in the expansion of other trades, and the hope of such expansion lies in the development of the great northwest, in the increase of its productivity and the accumulation of its needs by virtue of an ever-growing population.

The failure of Cleveland to improve its harbor results in the loss of an enormous prestige to the city. Take for instance the single item of iron ore and the equipment of a single company which could be supplied with material from Cleveland as a distributing point. The United States Steel Corporation has four furnaces at Youngstown, four at Newcastle, three at South Sharon, two at Donora, three at Clairton, three at Mingo Junction, two at Bellaire, two at Wheeling, three at Isabella and two at McKeesport, a total of twenty-eight for which Cleveland is the natural ore port. A number of these furnaces are modern, having a pig iron-making capacity of 2,500 tons per day. It is therefore a conservative statement that the twenty-eight have an average capacity of 400 tons of pig iron per day. Four hundred tons of pig iron is 800 tons of ore, so that they have a combined capacity of 22,400 tons of ore per day. Were it possible to operate these furnaces 300 days in the year they would consume 6,-

720,000 tons of ore per annum. These figures are merely intended to indicate the extent of the field that naturally belongs to the port of Cleveland. While Conneaut is the Steel Corporation port on the great lakes and while it has a railway of its own from Conneaut to Pittsburg, over which it annually hauls a heavier tonnage than is hauled on any railway in the United States, still it would gladly avail itself of the opportunity to supply the furnaces given in the foregoing list from the port of Cleveland. It is impossible for it to do so, however, to the extent that it would desire, owing to the inadequate facilities for maneuvering vessels at the port of Cleveland.

One has only to realize that these figures concern but one industry and one company to understand how vast the tonnage must be that Cleveland is annually losing owing to its lack of foresight. The greater class of vessels, meaning the Augustus B. Wolvin and others of approximate measurement, cannot get into the inner harbor of Cleveland at all. The big vessels that the Steel Corporation is now building, and succeeding vessels that it will undoubtedly build, will not come to Cleveland.

PERSONAL

Mr. Eugene H. Houghton, agent for the Pittsburg Steamship Co. at Duluth, has been transferred to the Chicago office of the company as assistant to Capt. Dennis Sullivan. He will be succeeded at Duluth by Mr. Herbert W. Brown.

Edward Ramage, who has been connected with marine work in Toronto for the past twelve years, has leased the dock at the foot of Berkley street upon which he is erecting buildings suitable for carrying on the work of ship building and repairing. Mr. Ramage was for some years connected with the Bertram Iron Works and later with the Clyde Steel Works.

Dr. Nelson P. Hulst, who has been identified with the interests of the Oliver Iron Mining Co. since 1897, will retire from the vice presidency of the new company on the first of the new year. He will at the same time relinquish all business connected with the extensive interests of the company. Dr. Hulst was the practical discoverer of the Menominee iron range and his life has been largely devoted to the exploration and development of that district. He was the discoverer of the Pewabic mine at Iron Mountain and opened the mine in the seventies as its general manager.

The remarkable record of Capt. H. W. Shepherd of the steamer *Sovereign*, who is also president of the Ottawa River Navigation Co., has just been commemorated by an illuminated congratulatory address. Capt. Shepherd is known as the "Ancient Mariner of Canadian Rivers and Lakes." He has sailed passenger steamers for over fifty years and has never lost a life or even had one of his passengers seriously hurt. Sailing from Ottawa to Montreal for twenty-nine years as captain of the steamer *Prince of Wales*, he covered a total of 530,000 miles and ran the dangerous Lachine rapids in the St. Lawrence river 18,000 times without a single accident. On the maiden trip of this vessel in 1860 he had on board the *Prince of Wales*, now King Edward VII. He has carried more distinguished people and more members of royalty and nobility than any steamboat captain on this continent.

The Monongahela Consolidated Coal & Coke Co. will increase its fueling equipment at New Orleans by 20 per cent.

LIFT BRIDGES AT BUFFALO, N. Y.

The rapidly increasing tonnage at the lake ports and especially at the extremities of the great lake system has led to frequent modifications in the terminal facilities at Superior, Duluth, Chicago, Milwaukee, Cleveland, Erie, Buffalo and other ports. The small streams which at first were sufficient to afford a harbor have long since proven to be wholly inadequate

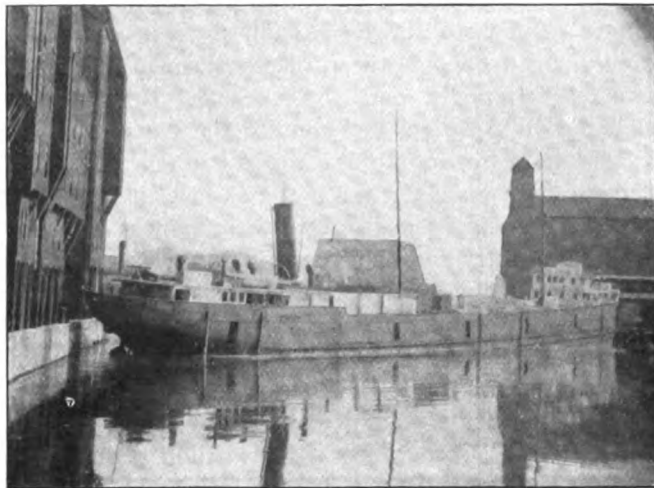


FIG. 1. THE UTICA TURNING IN A CHANNEL ONLY 200 FT. WIDE.

quate and have been gradually enlarged in an effort to prevent obstructions to the expanded lake carriers.

The phenomenal growth of the tonnage was not anticipated and hence the small rivers and canals were hemmed in by expensive improvements built up to their margins, while the

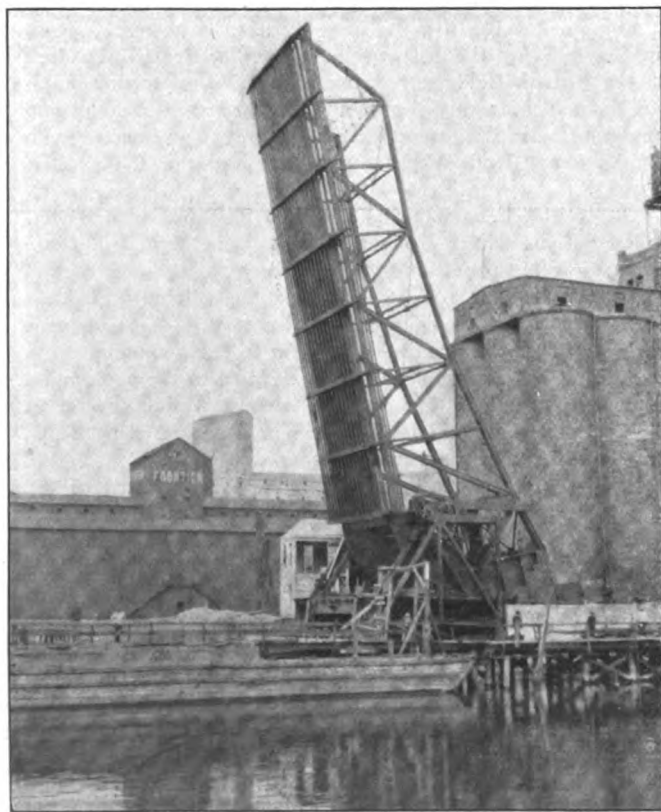


FIG. 2. THE SCHERZER ROLLING LIFT BRIDGE ACROSS THE CANAL AT BUFFALO.

tunnels under their beds were not placed deep enough to afford a sufficient clearance for the present draught.

Too little attention has been given in the past to the growth

of population and the consequent increase of tonnage and very little weight is now given to the demands of the future, since few persons realize that within thirty years our population will have doubled. This fact alone necessitates the reconstruction of terminals and the displacement of existing structures which a broader policy might in many cases have avoided. Thus the size of the propellers now navigating the lakes is such that they can no longer turn in the channels of the ports but must be warped into docks, which may be vacant, in order to swing around. It is also found to be necessary to remove the former center pier turn bridges and to substitute lift or bascule bridges to afford more waterway.

An interesting instance of bridges of this class is to be found at Buffalo where the river and canal are spanned by two such structures, at South Michigan avenue. (Figs. 2 and 3.)

The crossing of the city canal is now effected by a Scherzer rolling-lift bridge (Fig. 2) on which work was commenced June

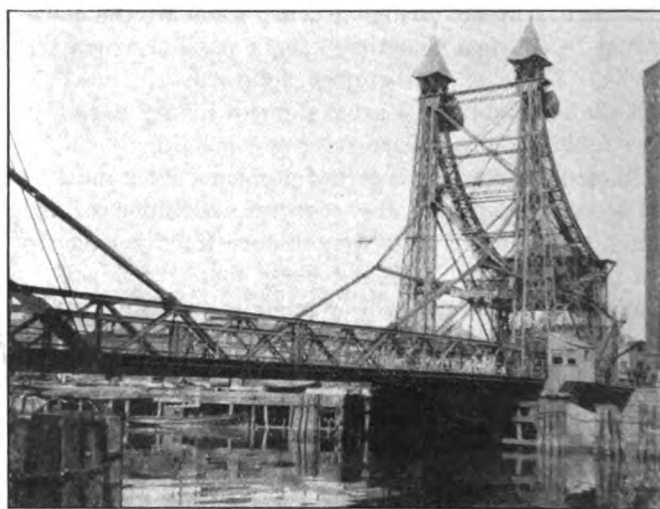


FIG. 3. THE JACK KNIFE LIFT BRIDGE OVER BUFFALO RIVER.

15 of this year and was completed and lowered on Sept. 25, when everything worked satisfactorily. The cost was about \$65,000 complete, including the approaches and temporary floating bridge, which consisted of a large barge. The bridge was built and erected by the Owego Bridge Co. under the local supervision of Mr. W. E. Foote, superintendent of construction. From the illustration, it will be seen that it is a single-leaf span operated by rolling on a counterpoised sector. To prevent slipping the roller is shod with lugs fitting into holes in the bed plates in the manner of a toothed rack.

The bridge has a span of 110 ft., a height of 30 ft. and a width in the clear, of 20 ft. There is a sidewalk on either side of 7 ft. The span is divided into seven panels of 15 ft. 6 in. each, except the first which is 15 ft. long. Its total weight is 550 tons of which about 300 is located in the counterweights. It is operated by an 80 H. P. engine by shafts connected with bevel-gears and can be opened or closed in one minute.

The Scherzer bridge is covered by a patent dated Aug. 4, 1903, to Albert H. Scherzer and Chas. T. Kandeler. It contains twenty-two claims, but the substance of them is briefly shown by the first and last which are as follows: (1) "A bascule bridge span consisting of trusses of two decks or floors arranged one above the other." (The bridge just finished contains but one floor.)

(2) "A rolling lift bridge comprising a span provided with rolling segments, adapted to rest on stationary supports, an operating strut pivotally connected to said span and provided with a toothed rack-bar, a rotative gear-pinion meshing with

the rack-bar on said operating-strut to give endwise motion thereto, a guide girder provided with a curved guide surface and a guide-roller on the operating-strut, adapted for engagement with the said curved guide-surface in the endwise movement of the strut."

In the rear of this bridge is also seen a portion of the latest and most improved mill of the Washburn-Crosby Flour Co. composed of a number of cylindrical bins built of terra-cotta, which has recently been opened for business at this point of transfer from lake to canal or rail haul.

Figure 3 illustrates another form of lift bridge which has been in service over Buffalo river for several years. It folds up like a jack-knife and requires only one minute to open or close, but as it needs an engine and an operator at each end it is not so economical as the one just installed across the canal. These two bridges will serve to demonstrate the necessity of looking ahead and it will not be many years before the growth of this port will further impress the incredulity of even the most optimistic of economists; to wit, "The wildest expectations of one year seem absurdly tame by the side of the actual facts of the next." It is only a half century since Henry Clay opposed the building of the Sault canal on the ground that it was "beyond the pale of civilization if not in the moon."

GREAT LAKES TOWING TO PAY DIVIDENDS

In a way the vessel business of the great lakes reflects the general condition of the iron trade which, as Mr. Carnegie once said, is either a prince or a pauper, enjoying a feast or enduring a famine. In seasons of unusual conditions vessel owners reap a harvest as, for instance, when ore went for \$1.25 a ton. Even at the present rate of 70 cents a ton there is something in it for the large carrier but probably not much, if anything, at all, for the small freighter. The towing business, however, is not subject to these violent fluctuations. It is a steady, prosaic sort of business in which charges are normal no matter what the freight rate may be, and owing to the nature of the various harbors it is the part of wisdom to employ tugs. It is interesting to note, therefore, that the Great Lakes Towing Co. has decided to resume the payment of its 7 per cent dividend upon its preferred stock. The company was compelled to suspend its dividend during its trouble with labor when its fleet of tugs was generally laid up and its earning power greatly crippled. Mr. Harry Coulby then became president and general manager of the company and decided to defer the payment of any dividend until the physical properties of the company had been thoroughly built up. The wisdom of this course is now apparent as the company is both from the physical and financial standpoint in excellent condition. The company has \$1,952,850 of preferred stock outstanding and \$1,675,000 of common. The payment of its first dividend will be made in January.

CANADIAN SHIPPING NOTES

An order has been placed by Capt. Randall with the Kingston Foundry, Kingston, Ont., for a composite barge for the Rideau Lakes trade.

A two-yard dipper dredge for the lower St. Lawrence is under construction at the yards of the Bertram Engine Works Co., Toronto, for delivery in May, 1905.

The new tug Togo, built for G. S. Campbell & Co., Halifax, N. S., for harbor towing work, was given her trial trip Oct. 20. The Togo is fitted for use as a fire and wrecking tug.

The steamer Kenosha of the Kewartha Lakes Navigation Co.'s fleet was burned to the water's edge at Lindsay, Oct. 23; the estimated damage is \$4,000. During last winter about \$8,000 was spent in overhauling and refitting the steamer.

The steamer Nell was totally destroyed by fire at her wharf,

Georgetown, on the Skeena River, B. C. Her cargo, including a number of horses, and the warehouse on the wharf were also destroyed. The total damage is placed at \$25,000.

The Dominion department of marine has placed thirteen gas buoys at important points on the ship channel of the St. Lawrence between Grondines and Ile Bigot. They are steel spar buoys showing acetylene gas lights from Pintsch lanterns at elevation of 13 ft. above high water mark.

Capt. Van Koenig, who has been given command of the second ice breaking steamer, named the Montcalm, to be placed by the Dominion government on the St. Lawrence with a view of keeping the river open for navigation to as late a date as possible, has gone to Scotland to bring the steamer out.

The important features of the report of the work of the government exploration steamer Neptune which has been two years in Hudson's Bay, is that the bay and straits can be navigated by suitably constructed vessels for about four months in the year—July to October—and that the only available port is at Fort Churchill.

The three years' fight between the Visgers Steamboat Co. and the Thousand Islands Steamboat Co. respecting the right of the former to land passengers at various docks and wharves in the Thousand Islands of the St. Lawrence has been decided by the United States Supreme Court, sitting at Syracuse, N. Y., in favor of the Visgers.

The Turbine Steamship Co. of Hamilton, Ont., is figuring on plans for an additional turbine steamer, and is reported to intend placing it on a run between Toronto and Niagara Falls next season. The Turbinia will be taken off the route in November and will be put on a run from a Florida port to Nassau, N. P., and other West Indian island points for the winter.

Considerable progress has been made during the year on the section of the Trent Valley canal between Peterborough and Lake Simcoe, Ont. The contractors expect to get the work completed next season. In reference to the outlet on Lake Ontario no definite decision has been reached, but it is understood that the Dominion government is favorable to giving it two outlets, one at Port Hope and the other at Trenton.

The lighthouse tender Haze will leave Buffalo about Nov. 9 for the purpose of taking up the buoys in Lake Erie and the Detroit river. All the important buoys will be replaced with winter buoys. The buoys at Dunkirk will be taken up about Nov. 10, at Erie Nov. 11, Sandusky and the islands Nov. 15, Maumee Bay Nov. 19, Detroit river Nov. 24. The gas buoys and light vessels of the Detroit river will be left in position as late as circumstances will permit, probably not until about Dec. 6. The position of Bar Point light vessel after its removal will be marked by a black spar buoy. Seneca shoal gas buoy, Waverly shoal gas buoy and the Niagara river buoys will be left in position as late as the season will allow.

Judge Hazel in the United States court at Buffalo last week handed down decisions in a three-cornered admiralty case. The suit was the Strong Transportation Co. against the steamer Sitka, Kund Anderson against the Sitka and the Gilchrist Transportation Co. against the steamer Eliza Strong and barge Commodore. In June, 1902, the Sitka was in collision with the Strong and Commodore in St. Mary's river. Judge Hazel holds that the Sitka is responsible for the collision with the Strong and that both the Strong and Commodore were at fault in the subsequent mix-up. A decree was entered dividing the damages and cost of the suit.

The excursion steamer Crystal, formerly the Pearl, which has not been in service this season, sank at her dock in the Niagara river last week.

STEEL CORPORATION MODERNIZING ITS FLEET

While of course it cannot be officially announced in so many words it can nevertheless be definitely set down that it is the purpose of the Pittsburg Steamship Co., the lake end of the Steel Corporation, to modernize its entire fleet of vessels on the great lakes. There is no other meaning to the recent order placed by Mr. Harry Coulby, the president and general manager of the Pittsburg Steamship Co., with the American Ship Building Co. for four freighters exceeding in dimensions anything at present on the great lakes. Already the Pittsburg Steamship Co. has offered for sale some of its whalebacks, which are among its smaller class of vessels, and will in addition, as rapidly as it can do so, dispose of its other moderate sized freighters. If it cannot actually sell them the policy of this giant corporation for scrapping its machinery is especially significant when taken in connection with its determination to bring its fleet to the highest possible state of efficiency. It should be borne in mind, however, that the fleet of the Pittsburg Steamship Co., consisting of 112 vessels, is a modern fleet and that its average carrying capacity is high. The average cargoes carried by its entire fleet in 1904 was 4,586 tons. The following table, which is compiled from the actual bills of lading, shows that fifty-four of its vessels carry between 5,000 and 7,000 gross tons, four between 4,000 and 5,000 gross tons, twenty-six between 3,000 and 4,000 gross tons and twenty-two under 3,000 tons:

OVER 5,000 TONS.

Names of vessels.	Gross tons.	Names of vessels.	Gross tons.
Bessemer	5,459	Queen City	5,598
Black	6,021	Rensselaer	6,748
Bunsen	6,632	Shaw	6,900
Coralia	5,331	Siemens	5,461
Cornell	6,499	Stephenson	5,558
Crescent City	5,705	Superior City	6,588
Edenburn	7,074	Van Hise	6,557
Ellwood	7,232	Watt	5,508
Empire City	5,672	Zenith City	5,098
Eriesson	5,357	Bryn Mawr	6,725
Fairbau	5,288	Carrington	5,265
Fulton	5,411	Corliss	5,320
Gates	7,031	Fritz	7,054
Harvard	6,623	Holley	5,309
Hill	7,019	Jenney	5,254
Houghton	5,842	Krupp	5,143
Lafayette	6,588	Martha	5,149
Linn	5,535	Magna	5,262
Maricopa	5,464	Maida	5,627
Mataafa	6,313	Maia	5,992
Mannaloo	6,000	Manila	7,019
Maliotoa	6,756	Madeira	6,999
McDougall	6,276	Marsala	7,012
Morse	6,385	Nasmyth	5,272
Murphy	6,829	Roebbing	6,890
Poe	7,027	Smeaton	7,192
Princeton	6,423	Thomas	5,223

ABOVE 4,000 AND UNDER 5,000 TONS.

Eads	4,716	Mariposa	4,074
Maritana	4,145	137	4,916

ABOVE 3,000 AND UNDER 4,000 TONS.

Briton	3,124	Neilson	3,359
Colgate	3,426	Roman	3,080
Corona	3,108	Saxon	3,050
Corsica	3,100	Trevor	3,118
German	3,134	105	3,030
Gilbert	3,825	107	3,050
Grecian	3,255	117	3,160
Manola	3,003	118	3,196
Meriska	3,110	130	3,120

Maruba	3,243	131	3,136
Matoa	3,040	132	3,109
Marina	3,037	133	3,127
Mather	3,274	134	3,106

UNDER 3,000 TONS

Bartlett	2,490	109	2,741
Cambria	2,900	110	2,770
Colby	2,400	111	2,779
Cort	2,998	116	2,736
Griffin	2,650	126	2,739
Joilet	2,850	127	2,741
La Salle	2,700	201	2,238
Masaba	2,994	202	2,205
Palmer	2,600	Thomson	2,620
Russeli	2,788	Wawatam	2,671
Whitworth	2,800	Wolvin	2,757

The vessels of the Steel Corporation have a carrying capacity in months of good dispatch of 1,500,000 tons. In a season of eight months, granting good dispatch, they would carry 12,000,000 tons. However, seasons are not always eight months long and good dispatch is not always the rule so that 10,000,000 tons for a season would be more nearly the general average than 12,000,000 tons. These four new freighters which have just been ordered, however, can easily carry 800,000 tons during a season, so that with them the carrying capacity of the Steel Corporation's fleet of vessels can safely be regarded as approaching 11,000,000 tons. The Steel Corporation brought down in 1902 16,500,000 tons of ore of which amount about 6,500,000 tons was carried in chartered vessels. In 1903 it brought down 12,500,000 tons, of which amount about 3,000,000 tons was carried in chartered vessels. It is not known how much tonnage it has chartered this year but it is somewhere in the neighborhood of 2,000,000 tons. It can therefore be seen that the needs of the corporation for ore fluctuate considerably. In building these four new vessels it does not appear to be the aim of the corporation to make its vessel capacity equal to its demands for ore. It will probably continue to be for some years the heaviest charterer of tonnage on the great lakes.

It does appear, however, to be disposed to completely modernize its great fleet so that it may reap the greatest possible profit out of the transportation end of its own business; and it must be admitted that in the work of modernizing its fleet it occupies a most unique position because it is naturally unaffected by the price of steel. It will doubtless see that its own plate is supplied for its own ships.

The four steamers just ordered by the company are distinctive in a number of ways from any steamers now appearing on the lakes. They will be duplicates and will be 9 ft. longer than the steamer Augustus B. Wolvin, the fame of which, it may be said, has penetrated to the furthestmost reaches of the civilized globe. The steamers will be 569 ft. over all, 549 ft. keel, 56 ft. beam and 31 ft. deep. Unlike the Wolvin and the Sahara they will not be built precisely upon the arch construction which has been so popular in a number of vessels lately constructed. Mr. Coulby, after consultation with a number of authorities, came to the conclusion that an arch was primarily intended to support weight from the top and that a more rigid longitudinal construction could be secured by a straight girder across the deck. The construction of the cargo hold also is a departure from anything at present on the lakes. It might be said to be a compromise between the Wolvin and the later Tomlinson boats. The cargo hold descends in a straight line from the deck until within 9 ft. of the tank top, when an inner hold or hopper is constructed 9 ft. from the skin of the ship and descending to the tank top. The top of the hopper is joined to the skin of the ship by an incline construction, thus avoiding what would otherwise constitute a shelf and thus also preventing any lodgment of ore. The water bottom is 5 ft. 6 in. deep and is used for water ballast in conjunction with the 9-ft. space formed by the hopper and

the sides of the ship. This construction gives enormous water ballast capacity, approximating 8,500 tons, making the steamer navigable in all sorts of weather and providing also extraordinary rigidity in the longitudinal section. The steamers will have thirty-four hatches spaced 12-ft. centers with no bulkheads whatever in the hold and will have a carrying capacity of 10,000 gross tons of ore. The hatch covers will be operated by the Brousseau device which is controlled by the American Ship Building Co. By this device all the hatches may be opened and closed from a central station and it is estimated that two men can do the work in twenty minutes.

The engines will be triple-expansion with cylinders 24½, 39 and 65 in. diameters by 42 in. stroke, supplied with steam from two Scotch boilers 15 ft. in diameter and 11½ ft. long, fitted with Ellis & Eaves induced draft and allowed 170 lbs pressure. In auxiliary equipment they will be more complete than any vessel now on the lakes. They will have Globe windlasses and capstan and Globe steering and mooring engines. Each steamer will have two complete direct-connected lighting plants of sufficient power to light every part of the ship. The steamers will be of steel construction throughout and will be lined with wood. The living quarters of the crew will be all that can be desired.

Two of the steamers will be built at the South Chicago yard of the American Ship Building Co. and one at the West Superior yard. It is not yet determined where the fourth will be built. Mr. Couilly was extremely anxious that one of the steamers should be constructed at the Cleveland yard, but unfortunately the inner harbor facilities at Cleveland are so limited that it would be impossible to take the steamer to the lake after she had been launched.

GREAT LAKES GETS IMPORTANT CONTRACTS

Mr. Antonio C. Pessano, president and general manager of the Great Lakes Engineering Works of Detroit, definitely closed contract on Wednesday of this week with the Cleveland Cliffs Iron Co. of Cleveland for a freight steamer to be the widest on the great lakes. The new steamer will be 533 ft. over all, 513 ft. keel, 60 ft. beam and 31 ft. deep. It will be seen that she is 4 ft. wider than any freighter now on the lakes. She will have thirty-one hatches, spaced 12 ft. centers and her carrying capacity will be 10,000 gross tons. While she is 36 ft. shorter than the vessels for which contracts were let last week by the Steel Corporation her wider beam enables her to carry precisely the same amount of cargo; and at the same time her shorter length gives her greater maneuvering power in harbors. Mr. Pessano represents that the extra beam possesses no disadvantages whatever in unloading while it enables the vessel to ride easier and to be safer in a seaway. Her hull will be constructed on the arch system, but the sides of her hopper will be straight, the 5 ft. of space between her skin and hopper being used for water ballast. In this she resembles the later Tomlinson boats. She will have triple-expansion engines and Scotch boilers and will have a speed of 11 miles an hour loaded. She is to come out next July.

Mr. Pessano also closed contract Wednesday with the Presque Isle Transportation Co. of Cleveland, which is one of the companies associated with the Cleveland Cliffs Iron Co., for a steamer of the following dimensions: Length over all, 524 ft.; keel, 504 ft.; beam, 54 ft.; depth, 31 ft. Her hull construction will be exactly similar to the new steamer building for the Cleveland Cliffs Iron Co.—arch construction and straight cargo hold. She will have thirty hatches, spaced 12 ft. centers, and will have a carrying capacity of 9,000 tons of ore. She will have triple-expansion engines and Scotch boilers and her speed will be 11 miles loaded. She, too, is promised for July delivery.

This makes six steamers that the Great Lakes Engineering Works has under way—four bulk freighters, one package freighter and a car ferry. Negotiations are now under way for the construction of another bulk cargo carrier.

CRAIGS TO BUILD A FREIGHT STEAMER

Mr. George L. Craig of the Craig Ship Building Co. of Toledo closed a contract last week with Cleveland parties for the construction of a 500-ft. freight steamer. The dimensions of the new steamer are: 500 ft. over all, 480 ft. keel, 52 ft. beam and 30 ft. deep. Her engine will be triple-expansion with cylinders 22½, 36½ and 60 in. diameters by 42 in. stroke. Steam will be supplied by two Scotch boilers 13 ft. 9 in. diameter by 11½ ft. long. The new steamer will follow the general design of the Sahara and will be of arch construction with twenty-eight hatches. She is to be delivered by the opening of navigation next year and work upon her will be started as soon as the steel can be secured. This makes the twentieth freight steamer for which contract has been let and definitely announced during the past two months, and of this number only one bulk cargo carrier is under 500 ft. in length.

FREIGHT SITUATION

Owing to the foul weather which has prevailed on the upper lakes for the past five days the movement of ore vessels has been much hampered and it is not now expected that the ore movement of October will equal that of September. In addition the carriers have been badly bunched at Lake Erie ports so that there has been much delay in discharging cargo. Neither the coal nor grain trades have shown any improvement during the week, so that while the demand for ore vessels has been quite active the supply has been sufficient to keep the ore rate at the old figures. In this respect the year has been an extremely lean one for vessel owners because there has not been the customary advance to meet the increasing hazard and expense of operation in the fall. The total shipments for the year, it is expected, will be between 18,000,000 and 19,000,000 tons, which will enable furnaces to tide over the winter with ample stock piles. Producers of ore have not been especially desirous of making sales at present figures, believing that ore in the ground is more profitable than its sale at present prices. The ore mining companies believe that a better price for ore will obtain next year, when it is expected that the demand for the commodity will be quite brisk.

There has been good demand for vessels in the lumber trade and prices have been marked up 25 cents from the head of the lakes. The rate is now \$2.75.

In the dense fog last week the steamer Jupiter of the Gilchrist fleet went ashore off Port Huron near the middle ground. She was released by the tugs Colton and Sarnia after several hours of hard pulling. The most serious mishap resulting from the fog was the accident to the Steel Corporation steamer Edenborn. She was bound down the St. Clair river with the whaleback 109 in tow. Whether she slowed down suddenly or turned out of her course is not known, but in some manner the heavy steel towing cable slackened and got caught in the steamer's screw, twisting itself round and round the blades and shaft before the engine could be stopped. A diver was secured to saw through the cable.

Contract for a steel vessel, the interior of which is to be furnished in unique manner with the modern conveniences of a Pullman car, has been let to the Manitowoc Dry Dock Co. by the Escanaba & Gladstone Transportation Co. The steamer will be used on Lake Michigan in the excursion trade between Escanaba, Gladstone and Mackinac island. The vessel will be 150 ft. long and will have accommodations for 700 passengers.

Navigation in the Maumee river was temporarily delayed last week by a wreck on the Wheeling & Lake Erie bridge. A freight train of five cars crashed through a fixed draw preventing the swing from being operated until the wreckage had been cleared away.

THE ROMANCE OF TRADE

The age of romance is past, we are told on all sides, and life is now a mere matter of money-getting by the most prosaic methods. There are no more lands to discover, no more fortunes to be seized in the once mysterious east. The simple historic fact that from the first voyage of Columbus to the discovery of the Columbia river and the acquisition of the Pacific coast by the United States, the voyagers over whose brilliant exploits the glamor of romance has been thrown by writer after writer were in reality traders, has been obscured by the narratives of their adventures and conquests. The limits of the world are known to us but the spirit of trade and the courage which animated the seamen of the past are as strong in the twentieth century as they were in the fifteenth.

In the place of new countries our merchants must today seek undeveloped markets but in the one quest as in the other it is to our sailors we must look. But at the present time, while every effort has been made to develop the almost inexhaustible resources of the interior of our country, our merchant marine has been suffered to dwindle into comparative insignificance and the courageous and capable race of Yankee seamen which has done so much in the past for the nation's prosperity and on which the prosperity of the future must in large measure depend, is threatened with practical extinction. At the outbreak of the civil war, the registered tonnage of the American marine amounted to 2,496,000 and 65.2 per cent of a foreign commerce valued at \$508,864,375 was carried in American ships. By 1903, American tonnage had fallen to 873,000, actually less than in 1810, and of the enormous foreign trade only 8.8 per cent was carried under our own flag, while over \$100,000,000 was paid to foreign ship owners for freight and passenger charges. How rapid was the ruin of the merchant marine is shown by the fact that in 1869 ninety-one vessels built for deep sea traffic were launched from American shipyards; in 1872, only three years later, there were but fifteen, and since 1901, not a single order has been given an American ship yard for a vessel for deep sea trade.

We have been accustomed to look on the mariners of the fifteenth and sixteenth centuries as the agents of geographical societies rather than merchants following on a larger scale and with more daring the usual methods of commerce in that age. As a matter of fact, the pursuit of geographical knowledge for its own sake is peculiar to this material age and the wealth of the East, not the love of science, was the inspiration of the seamen of a more romantic time. To the merchant of the fifteenth century the east was a land of fabulous riches from which he was kept by the peril and expense of the long, toilsome, overland journey through unknown and unsettled land. An untold fortune was waiting for the trader who should first reach "Far Cathay" by some easy route and the sea was the only way by which it could be done. That the merchants of the day were wise in their generation the history of the succeeding centuries demonstrates.

The Spanish conquerors who followed in the wake of Columbus were actuated by a desire so seize the gold at hand rather than to build up a permanent commerce. Geography and trade were alike indifferent to them. The treasures of the Aztecs and the Incas, the almost inexhaustible mines of the new world, gave to the monarchy a temporary splendor, but all the vast possessions of Spain brought little prosperity to her people and the Armada's ruin proved the oft plundered treasure fleets to be a poor substitute for the merchantmen of a commercial nation. The opportunities thrown away by the Spaniards were eagerly snatched by their rivals and it is to the Portuguese, the earliest, and to the English, the most successful of modern navigators, that we must look for mercantile enterprise as the motive for brilliant maritime exploit.

Nearly a hundred years before Columbus started on his first voyage the Portuguese prince, Henry the Navigator, began to send expedition after expedition along the western coast of Africa in the attempt to reach the promised land of the east. By 1440 the effect of this enterprise was already apparent to all Europe in the wealth which the Portuguese merchants derived from their trade with Guinea and when in 1497 Vasco Da Gama reached India by an all-sea passage Portugal at once attained the rank of a great maritime and commercial nation. The commercial prosperity which the genius of one man had procured for his country was thrown away by the folly of the government in succeeding generations and of all the possessions by which Portugal once controlled the eastern trade only three are now left to her in India.

Though the English began their career of adventure and conquest on the sea, which has since made them the masters of so much of the globe, much later than either the Portuguese or Spanish, they carried on the struggle with far more persistence and success. Much of the new world which Columbus discovered had been occupied by the Spanish conquerors, and the Portuguese were in possession of the richest markets of the east before the English entered in earnest the field of foreign commerce. The merchants of London and of Bristol were far quicker to see, however, the possibilities of undeveloped trade than their Spanish and Portuguese competitors had been and the first voyage of Sebastian Cabot to North America was immediately followed by the formation of a company known as the "Mysterie and Companie of the Merchants Adventurers for the Discoverie of Regions, Dominions, Islands and Places Unknowne." This company, the first of those great English corporations which gave to Great Britain her Indian empire and built up the great fur trade in Canada, began its operation auspiciously. Its first venture was an expedition in 1553 to China by the north east passage. Needless to say the expedition did not reach China but Richard Chancellor in the little ship, *Edward Bonaventura*, sailed into Archangel and began a trade with Russia which proved more and more valuable as the years went by.

About the same time began that invasion of the Spanish Main which was the first training school of the modern English navy and in which many of the most brilliant exploits in the history of ocean warfare were performed. Sir John Hawkins, the earliest of those buccaneers who first asserted the supremacy of the Anglo-Saxon race at sea, was actuated by no higher motive than the prospect of a lucrative trade in negroes, capturing them on the coast of Africa and selling them in the jealously guarded markets of the Spanish West Indies. So promising did this appear as a business proposition that the frugal Queen Elizabeth was induced to become a shareholder in the venture. Though the violent methods which Hawkins found necessary in his enterprise were not uniformly successful, the vigorous seamen of Cornwall and Devon were not slow to grasp the opportunities for gain afforded by trade with the Indians and fights with the Spaniards. Ship after ship sailed from the English channel, their holds filled with trinkets for the savages and their decks crowded with the best seamen in the world. When the dreaded Armada appeared at last in the channel it was to the buccaneers that England to a large extent owed her deliverance. In the victorious fleet were forty privateers led by Sir Francis Drake, fresh from the famous voyage around the world, and manned by the sailors who had for years faced the ships of Spain in far-off seas. Against such men as these Philip's ponderous galleons were powerless and the first of England's long list of great naval victories was won.

The incorporation in 1600 of the celebrated East India Co. under the style of the "Governor and Company of Merchants of London Trading with the East Indies" is an epoch in the history of the world. It is to the commercial necessities of

this great company that Great Britain owes her Indian empire and all the wealth that has flowed from the east into the coffers of her people for centuries. The first venture of the company was an expedition of five ships to Java laden with cargoes valued at 27,000 pounds and a factory was at once established in the islands. How rich was the field is shown by the fact that in 1613 and 1614 the Dutch profits from the India trade averaged 37 per cent.

The hardy seamen of the New England coast have been as successful in their field as the comrades of Drake and Hawkins in theirs. That the rich northern slopes of the Pacific coast are today American rather than British is due not to the energy of our pioneers but to the enterprise and strong business sense of Boston merchants. In 1778 the territory now occupied by the states of Oregon, Washington and Idaho, but then enveloped in the fog of Indian tradition, was laid claim to in a vague way by Spain, Great Britain and Russia. When the discoveries of Capt. Cook became known in Boston, however, two merchants, Messrs. Barrell and Bulfinch, saw at once the opportunity for untold profit. With them four others joined in subscribing \$50,000 to equip an expedition to this unknown shore for the purpose of carrying on a fur trade with the Indians. A ship of 213 tons, named the *Columbia*, and a sloop of 90 tons, the *Lady Washington*, were the two vessels sent on the long voyage. On Aug. 10, 1790, the ships sailed into Boston harbor again after an absence of nearly three years in which they had circumnavigated the world. So profitable did the enterprise appear that seven weeks later the *Columbia* sailed from Boston on her second voyage to the Pacific accompanied again by the *Lady Washington*. This time the two ships were not suffered to carry on their trade in peace. Troubles with the Indians served to keep the men busy but Capt. Gray in the midst of his trading operations was determined to find the mysterious great river, which all visitors to that coast had heard of and none had seen.

Early in 1792 he started out in search of it. Far out at sea he met the British squadron of three ships under the command of George Vancouver who had been sent on a voyage of discovery to the north of Nootka Sound. Gray told Vancouver that he had seen in latitude 46° what might be the mouth of the great river of Oregon but that he had been unable to cross the bar. Vancouver replied that he had seen a small opening two days before which he supposed was what Gray had seen but that he did not consider it worth the trouble of investigation. Gray was not so easily convinced, however, and in May, 1792, the American ran up the mouth of the *Columbia*. He landed with his crew, formally named the great river and the next day went back to trading with the Indians for fur. The river which Gray had discovered was destined to become the boundary of the United States of America. Twelve years afterward Lewis and Clark with their band of explorers reached the upper *Columbia* by the overland route and floated down to the sea. Seven years later the first town in Oregon was founded by John Jacob Astor and named Astoria after him. Had the discoverer Vancouver possessed more of the trader Gray's spirit the *Columbia* river would be a British waterway today. The two expeditions of the *Columbia* and the *Lady Washington* are only comparatively modern instances of the historic truth that the world's great discoveries have been due to the necessities of commerce and that the men who have achieved them have had, with their mercantile shrewdness, the hardihood and love of adventure that a race of seamen possesses as its birthright.

The Fore River Ship Building Co., Quincy, Mass., announces that it can use first-class sheet iron workers, erecting machinists and steam fitters who are used to marine work, such as pipe bending.

SHIPPING SUPPLIES TO PANAMA CANAL ZONE

The very vital question as to whether the trade to the Panama canal zone from United States ports is to be reserved to American ships will shortly be determined. According to latest advices from the bureau of navigation it appears that this question is one that the Panama Canal Commission will have to decide. In a practical way, of course, the matter is in the hands of the commission because the acceptance of all bids devolves upon it. It may be necessary at a later date to make the subject one of congressional enactment but the present opinion is that this is not necessary. A number of firms owning and operating steamships of American registry are preparing proposals for the transportation of supplies for which the Panama Canal Commission has recently opened bids, including 1,000 steel cars, 500 dump cars, eleven steam shovels and a quantity of clay pipe. In this connection it is interesting to note that the canal commission asked for bids on two different sets of specifications, one providing for delivery at Colon and the other providing that the commission should furnish transportation from New York to Colon. In the latter case the contractors furnishing cars and machinery will be required to set their wares up on arrival at Colon. If bids on the former specifications are accepted the contractors will naturally want transportation by the cheapest route. Should the commission, however, decide to furnish its own transportation from New York it would then have to decide whether the competition should be limited to American ships or not. Already lively competition among vessels engaged in the coastwise trade has been manifested to get this service and undoubtedly the rates made will be as low as is consistent with a reasonable profit. A member of a New York shipping firm owning steamers of American registry said that American vessel owners realize that the lowest possible charges would entitle them to the most consideration from the government and that his firm is prepared to make a rate that would just cover the cost of the service and leave an insignificant profit. It is believed by shipping men that an early decision on the part of the commission to ship supplies in American bottoms unless exorbitant rates are demanded, would insure effective competition among American vessel owners for the reason that the construction of the canal means a heavy volume of shipments over a series of years. As all goods destined for the zone must pay the ordinary American tariff unless shipped from an American port, it would seem as though this duty was justly part of the service reserved to the American ship under the coastwise laws.

EASTERN STEAMER BOUGHT FOR PACIFIC COAST

The steamer *M. F. Plant*, bought in the east by Goodall, Perkins & Co. of San Francisco, sailed on Oct. 8 from Philadelphia, under the command of Capt. H. C. Nelson, formerly of the steamer *Arcata*. She is intended to ply between San Francisco and Coos Bay, in opposition to the steamer *Breakwater*, recently bought by the Spreckles Brothers Co. The *M. F. Plant* was built in 1879 at Philadelphia and was first known as the *Cocoa*, then as the *Argonauta* and later as the *Cuba*. She was operated by the Southern Steamship Co. on the eastern coast. She is of 941 tons net register, has a length of 205.4 ft., a beam of 36 ft. and a depth of 25 ft. It is said that she has good accommodations for passengers.

DOES ANYONE KNOW?

The following letter has been received from Mr. Thomas Jack, Shamrock Shipping Co., Larne harbor, Ireland:

"Perhaps some of your readers could supply me with the address of the maker of a portable pistol arrangement for throwing and heaving a line from tug to tow which I believe is in use in America."

MR. E. R. WOOD'S ADDRESS

At the Philadelphia meeting of the Merchant Marine Commission Mr. E. R. Wood, representing the National Board of Trade, made a very forceful address and presented in addition a written report of great value. He said:

"My chief claim for venturing to address this commission is that I represent the National Board of Trade in this matter. After the department of commerce and labor was created by law the National Board of Trade felt that there was no question before the people of the United States of greater importance than that of the revival of American shipping. They appointed a committee, of which I happen to be chairman, to see what investigations and what movements the department of commerce could make in the very line in which your commission is now acting. I have had the privilege of having several interviews with Secretary Cortelyou and his commissioners, Mr. Austin and Mr. Chamberlain, on this very subject. The committee of the National Board of Trade felt that the matter had in many respects been debated perhaps a little too much in the air; that theories had been talked about without getting down to facts in all cases.

"For instance, we found that the department of commerce would not undertake to say how many tons were put on board vessels in all the world. The secretary or his assistants would not undertake to say just how many tons the world's business consisted of, and they practically accepted our figures as approximately correct—that there were put on vessels each year about 200,000,000 tons of goods for transshipment.

"I should like to bring up the doctrine of cheap initial cargoes. To go back a little in ancient history in order to illustrate just what I mean by that, during the middle of the eighteenth century the ships from Boston and New Bedford and all the way down the coast, as far as fishing interests were concerned, would load up with mackerel and codfish, and would go down to Cuba or Jamaica. They would there get sugar and rum and West Indian products and take them to England. They would take the cheap English hardware and cheap cotton goods and go down to the west coast of Africa and load up with slaves and come back to Cuba or Jamaica again, and from there bring home their return cargo of rum and sugar. There you had a world's trip, and the world's commerce really depended upon the codfish. There are old families in New England that still maintain the codfish on their coat of arms. They are not ashamed of the codfish.

"These are modern times, and conditions are entirely changed. We must have our cheap initial cargo all the same, but we cannot depend upon the fishing interest for it. Modern commerce has got too large. When you come to consider the question as to what the 200,000,000 tons of the world's commerce consists of, you will find there are 65,000,000 tons of coal. One-third of the whole transshipping business on the ocean is the carrying of coal. If you leave out that proportion of the commerce which the great transatlantic ferries and the great express steamers carrying the mails carry, you will find that one-half of the cargo business of the world is coal. That is apart from the express steamers, which apparently constitute a department by themselves.

"The proportion of the coal business is very much the

same in transatlantic management as in railroad management. You must have your initial cargo. That is where England really controls the commerce of the world. England puts on board of vessels 60,000,000 tons of coal a year. Mr. Chamberlain said we must not call it all cargo, because 15,000,000 tons were for steamship purposes. It makes no difference to the coal miner what the steamship does with the coal, whether she puts it in her coal bunkers or in her hold. It helps the miners, and it helps the railroads which carry it from the mines to the seaports. That makes the cheap initial cargo from England.

THE ENGLISH COAL EXPORT.

"She puts coal on board her vessels at varying prices. I have the statistics here, but I will not trouble you with them. The prices run from \$3 to \$4 per ton f. o. b. That is the price at which England sells coal to the world. We here are begging people at all our wharves to come and buy coal of us. We should be glad—I am interested in coal mining—to have our coal taken off our hands at \$2.25 a ton f. o. b. steamer, and England is today getting about \$3.50 f. o. b. steamer. You would say that is a sufficient difference to make American coal go, but it is not. The coal merchants in Philadelphia, men who have thoroughly examined the situation, say they cannot ship coal to the Mediterranean against an English rate of 5 shillings (that is \$1) a ton from Newcastle or Cardiff to Marseilles. The American rate would not be less than 15 shillings, or \$3. So a difference of \$1 a ton in the price of coal does not begin to touch it. It does not constitute an inducement to ship American coal.

"I ask you, gentlemen, to remember that I represent the National Board of Trade only when I state facts. When I talk theories I do so on my

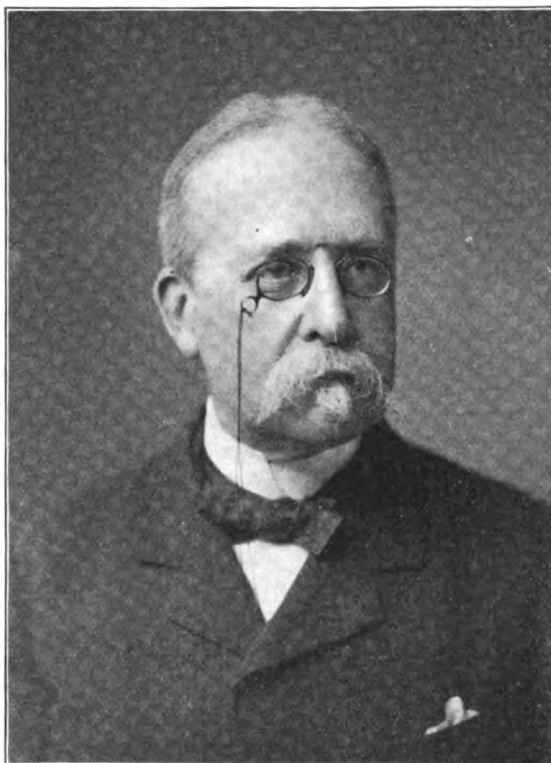
individual responsibility. To my mind the question turns on coal, because there you get your cheap initial cargo. You want to make it an inducement for American vessels to take coal, and this commission can not do better than to resolve itself into a commission to enable the United States coal miners to send out coal. You will get your shipping business instantly if you provide that the coal shall go out on American ships, and you will have the gratitude of a great many coal miners."

Senator Penrose. How would you get at it?

Mr. Wood. By a rebate. I would rebate to the outgoing ship a certain proportion, and as Mr. Firth said, you must be liberal, and if you are too liberal the American people will get it back in the competition that will result.

Senator Penrose. What do you mean by a rebate?

Mr. Wood. Suppose a vessel goes to France. France buys in England 8,000,000 tons of coal yearly. The United States is doing of the world's business about one-fourth. I leave out the Asiatic countries. It is therefore a reasonable proposition that we should strive to do one-fourth of the shipping of the world. Applying that to France, as a special example, we would have to sell France 2,000,000 tons of coal. We are buying from France \$60,000,000 worth of goods, and the duties on those goods will come to about forty millions. I am speaking in round figures, of course. A rebate of 10 per cent, which is perhaps cutting a little too close, of the duties on French imports would be \$4,000,000. You divide that among the 2,000,000 tons of coal, which you want to take there, and you get what is of course in one sense a bounty. But the



MR. E. R. WOOD.

vessel earns \$2 a ton, which is paid her by the government out of the duties, and it puts her in a position to compete with the \$1 a ton vessel that comes from England.

The Chairman. Your suggestion is very interesting, but do you think the American people would agree to a congressional enactment that would single but one product to be favored in the matter of transportation?

Mr. Wood. There are reasons why they might. The American people take a great deal of pride in their navy. They also take pride in the fact that the navy is not bought, as Japan is buying her navy, but is manufactured at home and is run by American people. I think they would take a pride in having the navy propelled by American coal; and it is not so propelled now. The American coal miners who are under contract to supply the navy with coal are today shipping English coal to ports all over the world to supply American naval ships.

QUESTION OF NAVAL FUEL.

Senator Penrose. You are mistaken about that. The navy uses American coal wherever it can get it. In some ports the ships have to use Welsh coal, but the navy uses Pocahontas coal chiefly.

Mr. Wood. I am speaking now on the authority of the firm who are interested.

Senator Penrose. I know them.

Mr. Wood. Mr. Bullitt himself told me that they supplied the American ships at Honolulu and San Francisco with coal from Cardiff.

Senator Penrose. That may be true; but all the naval vessels on the Gulf and on the Atlantic seaboard, wherever it is practicable to get it, use American coal; and that forms the great bulk of the coal used.

Mr. Wood. If an American vessel goes through the Suez canal, she is bound to take English coal, and so all through the Mediterranean. She can not get any other coal. But that is one thought. Then there is another, which is that to appease the American prejudice against such things, if you choose, you can make it on cereals as well as coal. The next item to coal in the shipments of the world is cereals, amounting on the whole to about 27,000,000 tons, nearly one-half of which goes out of the United States. You might easily promote the export in that way of about 20,000,000 tons of American products. I think that was Mr. Hill's suggestion, that cereals should have some advantage in that respect.

The Chairman. He proposed an export bounty.

Mr. Wood. Yes. But a rebate paid to the ship on duties on goods imported by her does not make the goods abroad any cheaper, neither does it provide competition with home goods, because the full duty is paid by the importer. It simply goes to the ship and raises the ship labor to the level of the home wage; that is all.

The Chairman. We are very much obliged to you.

MR. WOOD'S PAPER AS SUBMITTED.

Mr. Wood subsequently submitted the following paper:

"Mr. Chairman and gentlemen, when the people of the United States contemplate the resumption of American transoceanic commerce they are met at once by the fact of the higher wage rate prevalent among Americans, and as to shipping, by the legislation now existing for the preservation of Americanism. Three alternatives are at once presented.

"First. Abandonment of the effort to compete for transoceanic business.

"Second. Lowering to a greater or less degree the standard of American manhood in the marine; and to such degree as that standard may be maintained, supplementing it by some form of assistance.

"Third. A resolute maintenance of the American standard supported by such legislation as will put American sea labor on the same elevation as American land labor.

"The writer sees no other alternative. It is either an

abandonment of the ocean, or an approximation of living conditions on the ocean with those upon the land. He proposes to address this honorable commission in support of the third alternative. He comes before them as representative of the National Board of Trade, and asks them to note that in statements of fact he speaks for that board, but that for his theories he is himself only responsible. The national board has thought that in the discussion of this question scarcely enough attention has been given to the physical conditions involved. It is admitted that the people of the United States pay \$200,000,000 to the ocean carriers of the world, but what the total ocean traffic in tons of the world is has not yet been commented upon. So nearly as can be ascertained from data at hand the tons put on board ship each year for transoceanic carriage amount to 200,000,000 tons. Now, in handling this amount of material, the first essential condition is to supply the ship with a low-cost initial cargo. This was exemplified in the middle eighteenth century, when American shipping first began to make an impression upon the world's commerce.

"Then the cod and mackerel fishing industry of New England supplied an ever salable product at low cost to the farmer and his sons who choose to run down to Cuba or Jamaica; thence they would take a cargo of sugar and rum to England; load up there with cheap cutlery and cottons for the West African coast; then return to the West Indies with slaves, and make the homeward voyage with rum, sugar, and silver dollars, the profits of the round trip. At the present time, while the fishing industry has not lessened in actual amount or importance, the introduction of the steam engine, and the diffusion of mechanical improvement over all the world has completely changed the relative tonnage of the various items in the world's transoceanic shipment.

"As already stated, the total annual tonnage of the world may be taken at 200,000,000 tons as follows:

Coal	65,000,000	Tons.
Cereal crops	25,000,000	"
Spanish, Cuban, and other iron ores..	7,000,000	"
Sugar (say)	4,000,000	"
Various products	99,000,000	"
Total	200,000,000	"

"Now, if deductions are made for products carried by the great swift steamers in the mail and express business, it will be found that the carriage of coal makes one-half the transoceanic freight business. Thus the considerations before the commission divide themselves naturally into two heads. First, those which regard express steamers; secondly, those regarding the heavy freight carriers. I must repeat that as to this second head one-half of the problem turns upon the freightage of coal. Now, the American people are certainly not going to put up their funds for helping American vessels export English coal. But you must remember that, start your ships how you will, and take them where you will, one-half of their cargoes must be coal. Indirectly, then, your commission is a body appointed to devise means for exporting American coal. Why not face this fact squarely and apply your minds directly to solve the problem under this aspect, for whatever you do must result in increasing coal exports, or must result in failure. As to the head of the ocean express business, no other thought has occurred to the committee of the National Board of Trade than that the other great marine nations, England and Germany, must be met by their own weapons, although not necessarily upon their own already appropriated lines of travel. In other words, to such points on the globe as it may seem requisite to have direct American mail service, the post-office should pay whatever was required to secure the desired service. The hateful word 'subsidy' need not be used in this connection. The American people take a certain pride in not being outdone even in extravagance by others, and will probably at suitable points be willing to compete in mail

service with Great Britain at any cost necessary to obtain their object. At the present time the writer would regard the South American coast line on both its eastern and western side as being that part of the earth's surface with which we most need increased mail facilities.

"To return to the heavy freighter. In coal this country possesses the natural low-cost initial cargo, taking the place naturally of the salt-fish initial cargo of an hundred years ago. It is a large product, of unlimited amounts always available upon the seaboard, which is not at our ports called for by the present ocean carriers because they get their initial cargo in England. England, Germany, and France all cluster around the same narrow coal deposits, and all send their vessels to Cardiff or Newcastle upon their initial voyages. The consequence is that those two ports rank in tonnage next to Liverpool, which is itself a large coal shipper. The business of your committee is to provide that Norfolk and Mobile shall get a share of the trade supplied by Newcastle and Cardiff, but remember that this can only be done by American ships, getting their initial cargoes at these or other ports on either ocean front of our great country.

"As to the means of getting this result, it may be stated that English coals sells f. o. b., under varying conditions of market and quality, from 50 cents to \$1 above American coal, but that under present conditions freights are \$2.50 to \$3 per ton higher from Atlantic ports of United States than from British ports. The speaker would urge that any efforts to be made by the United States to obtain this trade should not be too ambitious. The 'factor' of the United States' business is about one-fourth of that of the civilized world, and it may be accepted that one-fourth of the coal supply could be within reasonable time secured by the United States without serious danger to existing commercial conditions. This country would come in for the natural growth of the business and it would be an actual relief to the pressure now beginning to be felt by the English mines. The problem thus narrows down as to how American labor on vessels employed in this business can be sustained at the same level as American labor employed on land. Here again the unpleasant words 'subsidy' or 'bounty' should not be used.

"The American seamen is neither to be subsidized nor pauperized, but as the revival of American shipping calls on him to meet pauperized labor on an element from which the competition of low-grade labor can not be shut out, there is an equity in making such dispositions, in whatever form they may be made, should be so called as to designate their true nature, which is that of a 'labor allowance.' Among the many suggestions made to reach this end the National Board of Trade would ask your attention to the plan of allowing to such American vessels as might take out a cargo of coal a labor allowance in form of rebate to the vessel of some proportion—for example, 10 per cent—of the tariff charges on return cargo of the vessel. Conditions vary so much in the different trades that there may be some countries where an allowance in this form, as tariff laws now stand, would be of no use.

"But taking the French trade as an example, and supposing our legislation to be framed in expectation of ultimately exporting one-fourth the coal tonnage of the world, then the proper share to be gained by the United States in the coal imports of France would be one-fourth of 8,000,000 tons or 2,000,000 tons.

"Equalizing average differences of freight against the United States will call for a labor allowance of \$2.50 per ton, making on the whole bill, if the trade be secured, an amount of \$5,000,000. Now, duties collected by the United States on merchandise imported from France amount to about \$40,000,000, on which a 10 per cent rebate to cover the labor differential would be only \$4,000,000, or hardly enough for the purpose, unless on the expectation that America would

only try for the cream of the business. It may not be devoid of interest to your commission to consider the business results of a national output of 2,000,000 tons of coal thus gained. It would be something like the following:

"First, at mines.—All inside and outside workers numbering 300, and representing the maintenance of total population of 1,200.

"Second, railroad transport.—On average haul to seaboard employment of 20 first-class trains constantly going and coming. Trainmen, section hands, and general help, say a force of 350, and representing the maintenance of population, 1,700.

"Third, ocean transport.—Equivalent to not less than 150,000 steamer tonnage steadily running, employing in all not less than 2,000 men, representing population of 4,000.

"Please note this estimate is made on the spur of the moment and based on general knowledge without specific inquiry.

The financial balance sheet would be something as follows:

NATIONAL INCOME.

By sale of 2,000,000 tons of coal to France at \$6	
per ton	\$12,000,000

DISTRIBUTION TO PERSONAL UNITS.

To landowners for royalties.....	150,000
To miners	1,350,000
To outside mine workers, supplies, management, etc	675,000
To railroad labor of all classes.....	1,875,000
To use of railroad capital.....	725,000
To dock labor and vessel crews of all classes.....	2,850,000
To fuel (of American product consumed).....	1,150,000
To American ship yard for upkeep and renewal of fleet and interest	2,125,000
To profits of mine lessees and merchants.....	1,000,000

Error and omission excepted.....\$12,000,000

"Obviously in the French trade a labor differential can be charged against customs in favor of vessels taking out coal to a very great general advantage. These conditions do not differ much as to any of the Mediterranean ports. In the Brazilian trade conditions are very different. Our deliveries of coal to Brazil at the rate of one-fourth her total coal purchases would be 250,000 tons, while our imports from Brazil come, of all kinds, to about 350,000 tons, so that total exports and imports in tons almost exactly balance. This makes a most desirable character of trade to the shipmaster, as his vessel thus goes full in each direction. The direct trade between the two countries would never have slipped from American hands had it not been for the low cost of initial cargo, which British vessels had in their coal. An English 'tramp' now will take coal from Newcastle to Rio, coffee to New York, and wheat to London, and in two or three days more is back at Newcastle again.

"As we collect no duty on imports from Brazil, there is no customs margin in that trade against which a labor differential can be charged. If the commission should find that the business could not be done by express steamers running under the encouragement of a liberal mail convention, then the only available method to secure the trade for American vessels would be the creation of a customs margin by a small duty on coffee, rubber, and hides. A half cent per pound on these commodities charged to the customs and rebated to American ships would secure the trade. Your commission, from these suggestions, will perceive afresh how various are the problems involved in the reviving of American shipping. Each section of the globe, each great nation in fact, presents its own especial features, which must be studied individually to insure success. The probable outcome of a labor differential charged against customs, in the forms indicated by this article,

would be that American vessels will go shopping around all over the world, just as they used to do eighty years ago, and will swap cargoes from port to port until they have picked up a lot that suits their fancy as likely to bring them the largest possible labor differential on arrival home.

"It has been suggested before your commission that there is something reprehensible in this process. For what reason the writer is wholly unable to understand as no one is injured. Certainly the home manufacturer is not for goods discharged from the American vessel must pay the same duty as all other imported goods of the same class. That American shipmasters and their crews should be interested in bringing into the United States those goods which pay the government the highest duty would seem to be a distinct advantage in every direction. The government gains, the manufacturer is protected against low-grade competition, and the home-staying multitude are educated as to the best of foreign products.

"This article has been written, taking coal as the ton basis of modern commerce, which it in fact is. The American people are believed to be resolved on this subject, and need only that the real facts of the situation should be put clearly and honestly before them to adopt the course plainly marked out for success in their desired aim. Questions of crimps, wages advanced, and boarding house difficulties are little more than byplay. Marryat's sea tales of a hundred years ago might have been written from the evidence given before your honorable commission. Such conditions have not seriously affected the commerce of England, and should not too much affect the work of the commission. The picture of your success must be wrought on larger canvas. It may, however, come to the point in a political sense, where interests shall have to be conciliated that have little merit in a commercial sense. There is no possible initial cargo today comparable with coal in lowness of cost and universality of sale, yet the cereals, pig iron, and petroleum may be treated as initial cargo at times for round voyages, and congress in its wisdom may see fit to put every American thing between the lakes and the oceans upon the list to certify the American vessel's right to a labor differential on her return cargo. Such a wide opening of the legislative doors will not alter the facts of commerce, but may add something to the difficulties of diplomacy. England and Prussia have treaties giving the vessels of those countries the right to enter American ports without discrimination of duty between them and American vessels. These treaties are subject to abrogation upon a year's notice, and the department of state will have lost its cunning if it should prove unequal to any situation the legislature may create."

TWO NEW STEAMERS FOR TOYO KISEN KAISHA

Several of the best vessels of the Toyo Kisen Kaisha Co. having been taken under the terms of the subsidy laws by the Japanese government for use as transports, the operations of the company have been crippled. M. Shiraishi, general manager, and W. H. Avery, general agent, have visited Great Britain, where arrangements have been made to send out the material for two new steamers to be built in Japan. The vessels will be of 15,000 tons each and will be longer than any ships on the Pacific coast except the Manchuria and Mongolia, owned by the Pacific Mail Steamship Co.

The match race between the motor boat Challenger owned by Messrs. Smith & Mabley, New York, and the X P D & C, the property of Frank Croker of New York, will take place on the Hudson next Saturday. The run will be from New York to Poughkeepsie and return, a distance of 140 miles.

The steamer Zopora building at the yard of Crawford & Reid, Tacoma, Wash., for the International Fisheries Co., was launched last week. Her engines will be installed by the Puget Sound Iron & Steel Works.

NAVAL ARCHITECTS AND MARINE ENGINEERS

The twelfth annual meeting of the Society of Naval Architects and Marine Engineers will be held in New York on Thursday, Nov. 17. Through the courtesy of the American Society of Mechanical Engineers the meetings will be held in the auditorium at No. 12 West 31st street, the sessions continuing Thursday and Friday. The sessions will conclude with a banquet on Friday evening. The program of papers is as follows:

THURSDAY, NOV. 17.

1. Simple Methods in Warship Designs a Necessity. By George W. Dickie, member of council.
2. The Semi-Globular Naval Battery. By Anson Phelps Stokes, associate.
3. The Sea Going Battleship. By Comdr. Wm. Hovgaard, royal Danish navy, member.
4. Some Further Notes on the Performance of the Torpedo Boats of the United States Navy at Sea. By Lieut. Comdr. L. H. Chandler, United States navy, associate.
5. The Position of the Center of Lateral Resistance. By L. E. Bertin, member.
6. Some Recent Experiments at the United States Model Basin. By Naval Constructor D. W. Taylor, United States navy, member of council.
7. Coaling of Warships at Sea—Recent Developments. By Spencer Miller, member.

FRIDAY, NOV. 18.

8. Time Allowance for Steam Yacht Races. By Ex-Engineer-in-Chief George W. Melville, United States navy, vice-president.
9. On the Rules of Lloyd's Register for Building Yachts to Class. By George Stanbury, member.
10. The Shipping and Ship Building of Puget Sound. By Frank W. Hibbs, member.
11. Maintenance of Machinery in Merchant Ships. By Robert Haig, member.
12. High Speed Gasoline Launches. By Clinton H. Crane, associate.
13. Speed and Power of Recent Motor Boats. By Alpheus A. Packard, member.
14. Recent Launching Practice of the Atlantic Coast. By Asst. Naval Constructor R. H. M. Robinson, United States navy, member.
15. Recent Launching Practice of the Pacific Coast. By Everett P. Lesley, Esq.

The new Anchor liner Caledonia, one of the fastest vessels ever built for the New York-Glasgow trade, was launched last week on the Clyde and was named by the Duchess of Montrose. The Caledonia is an imposing vessel with a straight stem and elliptical stern with two pole masts of fore and aft schooner rig and two black funnels. The steamer is divided into nine watertight compartments and will displace when loaded 16,000 tons. The first cabin accommodations will be amidships on the main and bridge decks and provision has been made for about 300 passengers. The main saloon is on the main deck, the library on the bridge deck, while on the promenade deck will be one of the handsomest apartments of the ship, the smoking room. The second cabin passengers of whom the Caledonia will accommodate about 400 will be quartered on the main deck. The steamer will be propelled by two sets of triple-expansion engines and will be ready for service in spring.

George Lawley & Sons, South Boston, Mass., will build a steel schooner yacht from designs by Cary Smith & Ferris of New York for a member of the New York Yacht Club. The yacht will be 123 ft. 6 in. on deck, 86 ft. 6 in. on load water line, 25 ft. beam and 15 ft. 6 in. draught.

CHICAGO GRAIN REPORT

Chicago, Oct. 25.—Vessels were in regular supply during the past week and while the shipping situation is unsettled rates were held steadily at a basis of 1¼ cents Buffalo and bay corn and nominally 3¾ cents through to Montreal.

The light run of wheat and corn receipts during the past few weeks tended in turn to the firm holding of local stocks, and incidental enhancement of cash values. Shippers find difficulty in trading for the present beyond moderate sized lots, suited more particularly to the compartment steamers.

There is very little doing in export traffic. Shipments of wheat for the past week were some 18,000 bu. as compared with about 1,000,000 a year ago. The export corn movement presents a better account and will likely work into good activity very shortly, but however justifiable the ruling prices for wheat our country is practically within a few cents, the approximated duty of 25 cents per bushel included, of an importing basis, which situation about precludes the prospect of wheat exporting for the near future.

The weekly shipments are distributed about as follows: Via all-rail lines—Wheat 385,000 bu., corn 113,000, oats 750,000, barley 190,000. Via lake to Buffalo, etc.—Wheat 475,000 bu., corn 700,000, oats 220,000, barley 60,000. And to Canada points via lake—Corn 227,000 bu., oats 223,000.

Lake and rail shipments:

	This week.	Last week.	Same week last year.
Wheat	860,732	614,680	781,272
Corn	1,073,333	1,649,009	1,833,244
Oats	1,200,254	1,739,412	1,244,944
Barley	248,649	271,413	121,083
	3,382,968	4,274,514	3,980,543
	Shipments since Jan. 1, 1904.		Same time last year.
Wheat	13,295,281		18,156,305
Corn	62,188,419		76,915,235
Oats	38,327,894		53,806,957
	113,811,594		148,878,497

Stocks of grain in elevators:

	This week.	Last week.	Same week last year.
Wheat	4,503,000	4,760,000	5,582,000
Corn	2,646,000	3,312,000	4,655,000
Oats	10,009,000	11,005,000	2,580,000
Rye	694,000	704,000	387,000
	17,852,000	19,781,000	13,204,000

NEW INSPECTORS APPOINTED AT NEW YORK

President Roosevelt has appointed Capt. Ira C. Harris to the position of supervising inspector of steam vessels for the New York district, vice Supervising Inspector Rodie removed. Mr. Harris is a son of the late Senator Harris of New York and was graduated from the Naval academy at Annapolis in a class with Rear Admiral Evans. Naval officers have for some time urged the president to appoint Capt. Harris to the steamboat inspection service. Mr. Harris served in the navy for fifteen years, reaching the rank of lieutenant commander, after which he resigned to engage in business life. When the war with Spain was declared he again entered the naval service and was assigned to the command of the repair ship Vulcan, which served in Cuban waters with Admiral Sampson's fleet. He later served as supervising engineer and inspector in the army transport service and was then transferred to the immigration bureau with headquarters in Manitoba. Undoubtedly Capt. Harris' commercial training will serve him in good stead in dealing with so purely a commercial enterprise as is the operation of vessels in the merchant marine service.

Capt. Henry M. Seeley of Boston was appointed inspector

of hulls and Theodore L. Mersereau inspector of boilers at the port of New York vice James A. Dumont, inspector of hulls, and Thomas H. Barrett, inspector of boilers, removed.

AROUND THE GREAT LAKES

The steamer Augustus B. Wolvin, which loaded coal at the Ellsworth dock at Cleveland this week, took on 247 cars.

The steamer Tadousac ran aground near the head of Bois Blanc island, but was released a few hours later by the tug Phillip.

The passenger steamer Tionesta of the Anchor Line made her first trip to Lake Michigan last week. Reception was tendered her at Chicago and Milwaukee.

Mr. T. F. Newman, general manager of the Cleveland & Buffalo Line, states that the boats of the line will run until Dec. 1. The passenger business during the past few weeks has kept up steadily.

A dispatch from Milwaukee says that the Pere Marquette Co. has decided to operate its six car ferries all winter on the Manitowoc, Milwaukee and Ludington line. The prospect of good business is said to be excellent.

President W. B. Schiller and other officials of the National Tube Co. visited Lorain this week on a tour of inspection. President Schiller congratulated the people of Lorain on the new winding basin which is just being completed by the city, enabling the largest class of vessels to use the port.

Information is desired regarding the whereabouts of Collin M. Arthur who was born in the island of Mull, Argyleshire, Scotland, and came to this country in the fifties. When last heard from he was following the lakes. Any information about him should be addressed to Box 304, Delray post office, Michigan.

While lying at anchor in the southeast bend in St. Clair river waiting for a tow the steamer Mason riding on the swell caused by a passing steamer punctured herself on her own anchor and rapidly filling with water settled on the channel bank. She was pulled off by the tug Lorman and taken to the Detroit dry dock.

The steamer Wawatam left the dry dock at South Chicago last week after what is said to have been the fastest repair job ever done on Lake Michigan. The Wawatam was rescued from the reef at North Point, Milwaukee, and taken to Chicago. It was found that fifty frames and thirty-four plates were broken. The steamer was in dry dock nine days.

The steamer P. P. Miller, bound from Escanaba to Lake Erie with a cargo of iron ore, stranded last week on Simmon's reef at the western entrance of the straits of Mackinaw. The wrecker Favorite and the lighter Rescue were sent to her assistance and she was released after 1,500 tons of ore had been lightered upon the Rescue. The Miller was taken to Mackinaw City, where it was discovered that her pumps could easily control the leakage and the lightered cargo was then reloaded upon her. She made the trip down the lakes with her two forward compartments leaking, but was navigated without difficulty.

The steamer Robert L. Fryer, a wooden vessel owned by the Mitchell Co., got into trouble off Fairport last Saturday night owing to some derangement of machinery. She was compelled to signal for assistance. During the night the steamer M. A. Hanna, bound down with ore, took a tow line from the Fryer but the line became entangled in the Hanna's wheel and she had to cut loose. The tug Lutz was sent for and towed the Fryer into the port of Cleveland, where repairs were rapidly made.

The Atlantic Works, Incorporated, 28th street and Gray's Ferry road, Philadelphia, has received an order from the McCausland Ship Building Co., Kingston, Rondout Station, N. Y., for one of their bevel band saw machines.



Vol. XXX.

CLEVELAND, O., OCTOBER 27, 1904.

No. 17.

For Marine Work we
Make a Specialty of

STEEL SHIP PLATES

TO MEET ANY REQUIRED
SPECIFICATIONS, AND

STEEL CASTINGS

OF ANY WEIGHT FROM
100 to 75,000 Lbs.

OTIS STEEL CO., Ltd.

Head Office and Works, - - CLEVELAND, OHIO.

AGENCIES:

Detroit: Geo. W. House, Union Trust Building.

New York: Thorpe, Platt & Co., 97 Cedar St.

St. Louis: C. A. Thompson, 516 N. Third St.

San Francisco: John Woodlock, 154-156 First St.

Montreal: Homer Taylor, 183 St. James St.

Salt Water Corrodes all Metals EXCEPT the
Victor Non-Corrosive Silver

which is also Non-Tarnishing.

Tensile Strength 53,280 Lbs.

Elongation 15.7%.

Used for Bilge Pumps, Valves, Fittings, Sea Connections,
Condensers, Propellers, Deck Fittings, Hardware,
Plumbing Fixtures, Railings, etc.

Takes a Silver Finish, Needs No Polishing.

Write for sample and prices.

VICTOR METALS CO.

EAST BRAINTREE, MASS.

NEW YORK OFFICE, 29 BROADWAY.

GEO. STRATFORD OAKUM CO.

JERSEY CITY, NEW JERSEY.

Established
1860



Manufacturers
of all grades of

Oakum

Spun
Cotton

FOR SALE AT SHIP CHANDLERS EVERYWHERE.

Fogg's Resilient Felt Mattresses and
Cushions.

Manufactured by

M. W. FOGG,

202 Front St., N. Y.

Send for Illustrated
Catalogue.



Improved Belt Helmet

A. SCHRADER'S SON.

32 Rose Street, NEW YORK.

Manufacturer of

Submarine Armor and Diving Apparatus.

We carry a complete stock of Dresses, Hose
and Repair Sundries.

All orders filled day received.

Write for our prices.

THE BROWN HOISTING MACHINERY CO., INCORPORATED

Sole makers of the "Brownhoist" High Speed Cantilever and Gantry Cranes. The most economical cranes
for covering large areas in steel works or ship yards.

Machinery For Handling

Structural Work, Marine Plates, etc., in Ship
Building Yards.

**Coal and Ore Handling
Machinery.**

Cranes of all Types.

Steam, Electric and Hand Power.

Main Office and Works, CLEVELAND, O., U. S. A.

Eastern Office, 26 Cortlandt St., New York City.

Pittsburg Office, Carnegie Building, Pittsburg, Pa.

European Office, 39 Victoria St., London, S.W.

Established 1857.

AMERICAN SHIP WINDLASS CO.
PROVIDENCE, R. I.

We have completed our new IRON FOUNDRY, and are prepared to execute orders for Castings, guaranteeing first-class
work, prompt service and reasonable prices.

SHIP MACHINERY

EMBODYING THE LATEST DESIGNS AND MANY
IMPORTANT PATENTED IMPROVEMENTS.

SOLE BUILDERS OF THE

Original and Only Automatic Steam Towing Machine.

SEND FOR ILLUSTRATED CATALOGUE.

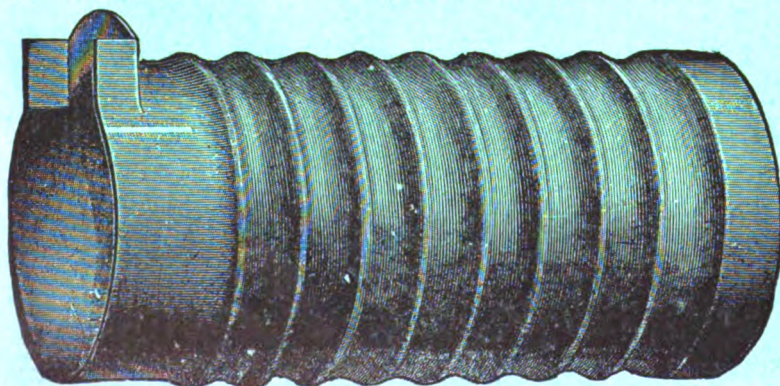
P. O. BOX 53.

Address: FRANK S. MANTON, President.

MORISON SUSPENSION BOILER FURNACES

FOR LAND AND MARINE BOILERS.

UNIFORM THICKNESS—EASILY CLEANED
UNEXCELLED FOR STRENGTH.



Also Fox Corrugated Furnaces.

MANUFACTURED BY

THE CONTINENTAL IRON WORKS,

West and Calyer Sts., NEW YORK.

Near 10th and 23d Sts. Ferries,

Borough of Brooklyn.

ALLEN ^{PORTABLE PNEUMATIC} RIVETING MACHINES.

The following concerns are using our machines



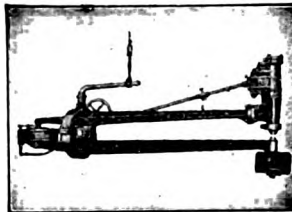
"Cable Address, Riveters" W. U. Code

JOHN F. ALLEN,

United States Navy
Yard, Bremerton,
Wash.

United States Navy
Yard, Portsmouth,
N. H.

United States Navy
Yard, Mare Island,
San Francisco, Cal.



Brown Hoisting Machinery Co.,
Cleveland, O.

New York Ship
Building Co.,
Camden, N. J.

Wm. R. Trigg Co.,
Richmond, Va.

Canadian Ship
Building Co.,
Bridgeburg,
Ont.



ESTABLISHED 1872.

370-372 Gerard Avenue, NEW YORK K.

Steel Castings

from 100 to 75,000 lbs.

Otis Steel

Ship Plates
Flange Plates
Tank Plates
Steel Car Axles
Forgings of all kinds

"Otis" Fire Box Plates a Specialty.

OTIS STEEL CO., Ltd.,
Head Office and Works, CLEVELAND, O.

New York: Thorpe, Platt & Co., 97 Cedar St.

Montreal: Homer Taylor, 183 St. James St.

AGENCIES.

St. Louis: C. A. Thompson, 516 N. Third St.

San Francisco: John Woodlock, 154-156 First St.

U. S. Automatic Injector

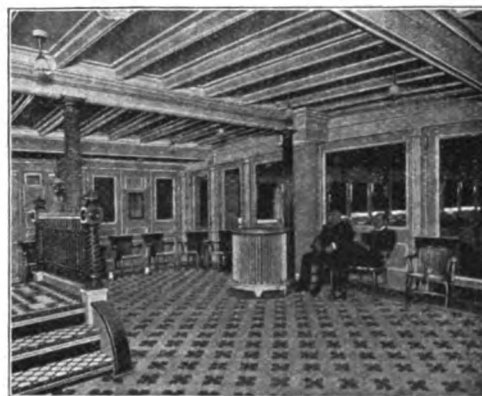
U.S. INJECTORS ARE BEST

The government of the United States says so.
Over 200,000 individual engineers say so.
Such practical endorsement means dependable excellence.

Buy of the dealer. Do not accept a substitute.
Catalogue and valuable pocket reference book,
which answers 500 questions of vital importance to
every engineer, sent free to any address.

American Injector Co.,
Detroit, Mich., U. S. A.

INTERLOCKING RUBBER TILING.



As laid by us on the Quarter Deck, Dining-room,
Stairway, etc., of the Steamer "City of Troy."

Is noiseless, non-slippery, waterproof and thoroughly sanitary, more durable than stone or earthen tiles, elegant in appearance, manufactured in a carefully selected variety of colors. Endorsed by the best architects and engineers. A perfect floor for business offices, banking-rooms, court-rooms, vestibules, halls, billiard-rooms, smoking-rooms, cafes, libraries, churches, hospitals, hotels, etc. It is especially and peculiarly adapted for Steamships, Yachts, etc. It stands the constant straining and racking without cracking or separating, and its non-slippery feature is of high value. Samples, estimates and special designs furnished upon application.

BEWARE OF INFRINGERS. PATENTED.

MANUFACTURED SOLELY BY

NEW YORK BELTING & PACKING CO., Ltd.

91-93 CHAMBERS ST. NEW YORK

PHILADELPHIA, 724 Chestnut St. BOSTON, 232 Summer St.

BALTIMORE, 41 South Liberty St. INDIANAPOLIS, 229 So. Meridian St.

CHICAGO, 150 Lake St. ST. LOUIS, 411 No. Third Street.

SAN FRANCISCO, 509-511 Market St.

ARTHUR L. GIBSON & Co., 19-21 Tower Street, Upper St. Martin's Lane,

LONDON, ENGLAND.

WM. L. BROWN, President.

J. C. WALLACE, Vice-Pres.

O. R. SINCLAIR, Sec'y and Treas.

ALFRED G. SMITH, Gen'l Supt.

CHICAGO SHIP BUILDING COMPANY,

Steel Ship Builders and
Dry Dock Proprietors.

Dry Dock and Yards: 101st St. and Calumet River, CHICAGO, ILL.

MILWAUKEE DRY DOCK COMPANY,

MILWAUKEE, WISCONSIN.

Ship Repairs of all kinds.

Two Ship Yards offer every Facility for the Repair of both Steel and Wooden Vessels.

South Yard Dock is 450 ft. long on keel blocks; 460 feet over all; 60 feet width of gate, and 16 feet over sill.

West Yard Dock 312 feet on keel blocks; 45 feet width of gate, and 12 feet over sill.

RUDDER PIT IN EACH DOCK.

ELECTRIC LIGHTS FOR NIGHT WORK.

Main Office at SOUTH YARD, Foot of Washington Street.

EDWARD SMITH, President.

WILLIAM KNIGHT, Ass't Sec'y and Treas.

ADAM STEEL, Superintendent.

THE BUFFALO DRY DOCK COMPANY,

GANSON STREET AND BUFFALO RIVER.

Operating Four Docks, Sixty-Ton Shear Legs, and in every way Equipped with Modern Plant for the
Building and Economical Repairs of

STEEL AND WOODEN SHIPS.

LONG DISTANCE TELEPHONE CONNECTIONS:

Office Telephone, 515 Seneca.
President's Telephone, 209 Bryant, Residence.

President's Telephone, 3920 Seneca, Office.
Asst. Sec'y & Treas., Telephone, 609 Bryant, Residence.

THE SUPERIOR SHIP BUILDING COMPANY,

Ship and Engine Builders.
Dry Dock and Repairs of all kinds.
Two Largest Dry Docks on the Lakes.

Large Stock of Material Always on Hand for Repairing Wooden and Metal Ships.

Repairing Promptly Attended to, Night or Day.

West Superior, Wis.

JAS. C. WALLACE,
President.

R. C. WETMORE,
Vice-President and Treasurer.

ROBERT LOGAN,
Manager.

DRY DOCKS IN CLEVELAND:

No. 1, foot Weddell St., 547 ft. x 65 ft. x 15 ft. 6 in.
No. 2, foot Weddell St., 450 ft. x 50 ft. x 16 ft.

No. 3, Elm St., 340 ft. x 50 ft. x 13 ft.
Dry Dock at Lorain, 560 ft. x 60 ft. x 17 ft.

THE AMERICAN SHIP BUILDING COMPANY,

Office, 120 Viaduct, Cleveland, O.

Marine and
Stationary Engines

STEEL SHIPS

Boilers and
Auxiliary Machinery

Sole Agents for the Lakes for the Ellis & Eaves Induced Draft System, as applied to boilers, giving increased power and great economy.

Prompt Attention Given to Ship Repairs of All Kinds

WORKS AT CLEVELAND AND LORAIN

ALEXANDER McVITTIE, President and Manager. WILLIAM C. McMILLAN, Vice President.
CHARLES B. CALDER, General Superintendent.

M. E. FARR, Secretary and Treasurer.
FRANK E. KIRBY, Consulting Engineer.

DETROIT SHIPBUILDING COMPANY,

Ship and Engine Builders, Detroit, Mich.

Sole Owners for the Lakes and Atlantic Coast of the HOWDEN HOT DRAFT SYSTEM as applied to Boilers, giving increased power and great economy.

Steel Ship Yard Located at Wyandotte, Michigan.

Wooden Ship Yards and Dry Docks, Foot of Orleans Street, and Foot of Clark Avenue, Detroit, Mich.

The Jenks Ship Building Co.

STEEL SHIP BUILDERS,

MARINE ENGINES AND BOILERS.

Prompt Attention Given to Repairs of all Kinds on Ships, Engines and Boilers.

OFFICE AND MACHINE SHOPS
AT FOURTH STREET.

YARDS AT FOOT OF LINCOLN
AVENUE.

PORT HURON.

-

-

MICHIGAN.

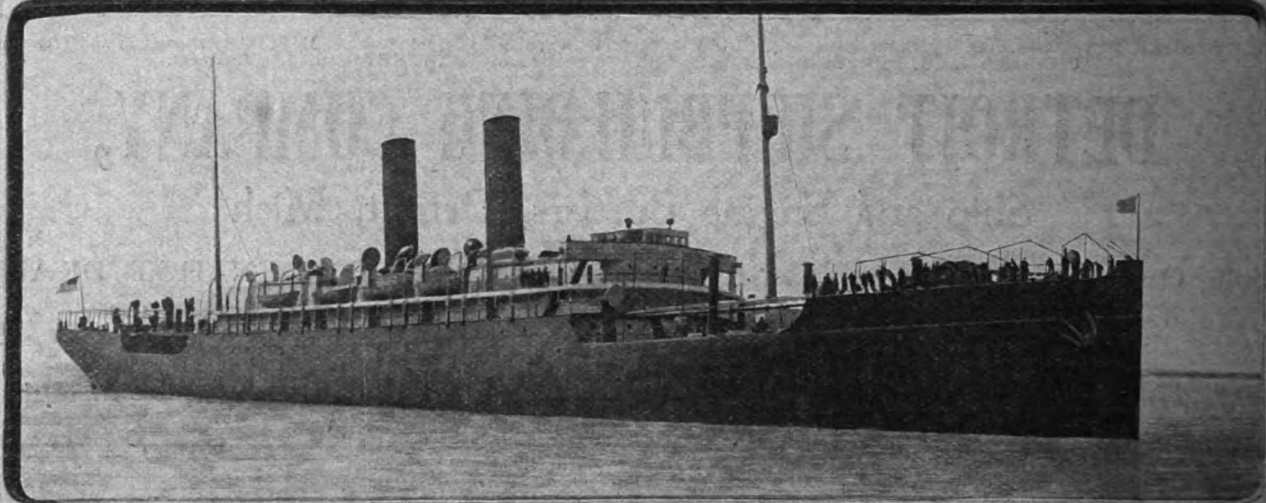
TO ENGAGE SERVICES

Lighter T. F. NEWMAN, Wrecking Steamer
FAVORITE, Wrecking Steamer SAGINAW,
or any Tug or Wrecking Service between Lake
Huron or Lake Erie, call

PARKER BROS. CO., Ltd., DETROIT, or any office THE GREAT LAKES TOWING CO.

OUR SHIPYARD

WITH ITS ACCOMPANYING DRY DOCKS
AND WORKS, WAS CAREFULLY DESIGNED,
EQUIPPED AND COMPLETED FOR THE



CONSTRUCTION AND REPAIRING
IN EVERY DETAIL OF

BATTLE SHIPS · ARMORED CRUISERS ·
PROTECTED CRUISERS · GUN BOATS ·
TORPEDO BOATS · TORPEDO BOAT
DESTROYERS · SUBMARINE BOATS ·
OCEAN LINERS · PASSENGER STEAM
ERS · FREIGHT CARRIERS · ETC · ETC ·

NEWPORT NEWS SHIPBUILDING & DRY DOCK CO.
1 BROADWAY NEW YORK — NEWPORT NEWS, VA.

CLYDE LINE APACHE

U.S. BATTLESHIP MAINE

THE
WM.
CRAMP
— & SONS —
SHIP & ENGINE BUILDING Co.
ESTABLISHED 1830

CONTROLLING AND OPERATING THE
I.P. MORRIS COMPANY **KENSINGTON SHIPYARD Co**
(ESTABLISHED 1829)

WARSHIPS AND MERCHANT STEAMERS
Pumping, Blowing and Hoisting Engines, Dry Docks
Vertical and Horizontal Turbines
Centrifugal Pumping Machinery
Marine Railway.

Repairs to all classes
of vessels

LARGE TURBINE

Philadelphia

VIEW OF ONE OF OUR DRY DOCKS

After four years of investigation, the Boiler Committee appointed by the British Admiralty have unanimously declared that water tube boilers are more suitable for Naval purposes than cylindrical, and have again placed THE BABCOCK & WILCOX at the head of all types.

THE BABCOCK & WILCOX CO.

NEW YORK and LONDON

Bayonne, N. J., U. S. A.
Renfrew, Scotland.

WORKS:

Paris, France.
Oberhausen, Germany.

PINTSCH GAS LIGHTED BUOYS

Adopted by the English, German, French, Russian and United States Light House Departments for Channel and Harbor Lighting; over 1700 gas buoys and gas beacons in service. : : : :

BURN CONTINUOUSLY FROM 80 TO 365 DAYS AND NIGHTS WITHOUT ATTENTION, AND CAN BE SEEN AT A DISTANCE OF SIX MILES. : : : :

Brilliant and Steady Illumination.

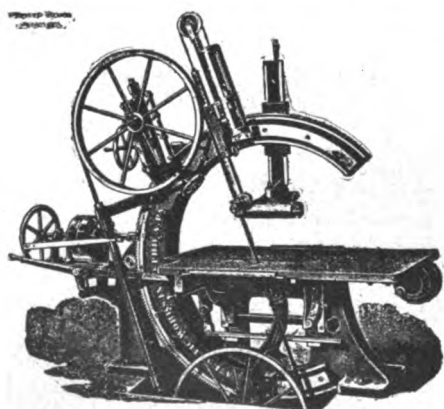
Economical and Reliable in Operation

Controlled by the

SAFETY CAR HEATING AND LIGHTING COMPANY,

160 BROADWAY,

NEW YORK CITY.



ADJUSTABLE BEVEL BAND SAW.—Will bevel both ways at 45 degrees. Power Movement to change angles. Power feed in three directions.

ESTABLISHED 1869.

INCORPORATED 1896.

ATLANTIC WORKS INCORPORATED,

Successors to Berry & Orton Company.

2870-72-74-76-78 Gray's Ferry Road, PHILADELPHIA, PA.

MANUFACTURERS OF

MACHINERY FOR WORKING WOOD

FOR USE IN

Ship Yards, Car Shops, Railroad Shops.

SEND FOR CATALOGUE.

ESTIMATES FURNISHED.

Hollow Chisel Mortisers.

Car Sill Dressers.

THE NICLAUSSE BOILER.

The largest merchantmen in the world, the S. S. Minnesota and Dakota, of 33,000 tons and 11,000 H. P. each, are equipped with Niclausse Boilers.

641,000 HORSE POWER IN THE NAVIES OF ELEVEN NATIONS.

THE NEW JAPANESE CRUISERS, KATORI AND KASHIMA, OF 16,000 H. P. EACH, AND IN THE UNITED STATES NAVY THE ARMORED CRUISERS PENNSYLVANIA AND COLORADO, 23,000 H. P. EACH, AND THE BATTLESHIPS GEORGIA AND VIRGINIA, 19,000 H. P. EACH, WILL BE FITTED WITH THESE BOILERS.

THE ONLY WATER-TUBE BOILER SUCCESSFULLY USED AND PROVED IN LARGE SHIPS.

Requires no space at sides or rear—cleaned from the front.

Employs no tube-caps—tubes can readily be withdrawn without mutilation.

FORGED STEEL THROUGHOUT.

THE STIRLING COMPANY

Chicago.

THE STANLEY B. SMITH COAL AND DOCK CO., TOLEDO HARBOR, TOLEDO, OHIO.

1,800 Feet of Dock.

6 McMyler Derricks.

Capacity 3,000 Tons Daily.

Fuel Lighters. —"KANAWHA."
—"PENNSYLVANIA."
—"HOCKING."

Docks. —PENNSYLVANIA R. R.
—HOCKING VALLEY R. R.
—TOLEDO AND OHIO CENTRAL R. R.

SMITH'S COAL DOCK, Detroit River, DETROIT, MICH.

12 Pockets.

Platform.

Low Dock.

Operated by STANLEY B. SMITH & CO.

MARINE SUPPLY COMPANY—STORE AND ICE HOUSE ON DOCK.

PITTSBURG COAL COMPANY.

Steamboat Fueling Facilities at Various Points on the Great Lakes:

CLEVELAND HARBOR { 4 Car Dumpers.
3 Lighters.

FAIRPORT HARBOR { 1 Car Dumper.
1 Lighter.

ASHTABULA HARBOR { 1 Car Dumper.
1 Lighter.

ERIE HARBOR { 1 Car Dumper.
Fuel Pockets.

DETROIT RIVER BRANCH { Docks and Pockets at
Sandwich and Amherstburg.

SAULT RIVER BRANCHES { Dock and Pockets at Detour.
Dock and Pockets at Sault Ste. Marie. (The Port Royal Dock Co.)

WE FURNISH ONLY
THE BEST GRADE OF

Pittsburg and Youghiogheny Coal.

GENERAL OFFICE, LAKE DEPARTMENT, PERRY-PAYNE BUILDING, CLEVELAND, OHIO.

LEWIS & HUGHES

Successors to LEWIS & CRANE

TIMBERS 48 x 48 INCHES, 120 FEET LONG

**Spars Ship Timbers Decking Planking
Oregon Pine**

Branch Office:
16 Broadway, NEW YORK

Delivered, Prices all Rail, any Station in the United States
or Canada Cargo Shipments to any part of the World

SEATTLE, WASH.

Books on Naval Architecture, Ship Yard Practice, Seamanship, Etc.

AMERICAN PRACTICAL NAVIGATOR—Nathaniel Bowditch. 1908 edition	\$2 25	POCKET BOOK OF MARINE ENGINEERING, RULES AND TABLES—Seaton and Rounthwaite. For marine engineers, naval architects, superintendents and others engaged in construction of marine machinery	\$3 00
DATA BOOK—Naval architects and engineers' data book. By T. H. Watson. A reliable and simple means of recording valu- able data, etc., of vessels and engines. Size of book, 8¾ in. by 5 in., cloth	1 50	PRACTICAL COMPASS ADJUSTMENT on Iron, Composite and Wooden Vessels. Illustrated.—Capt. W. J. Smith	2 00
ELECTROMAGNETIC PHENOMENA AND THE DEVI- ATIONS OF THE COMPASS—Com. T. A. Lyons	6 00	PRACTICAL INFORMATION ON THE DEVIATION OF THE COMPASS, for the use of Masters and Mates of Iron Ships— J. T. Towson	2 00
ELEMENTARY SEAMANSHIP—By Barker. New and en- larged edition	2 50	PRACTICAL SEAMANSHIP FOR USE IN THE MERCHANT SERVICE: Including all ordinary subjects; also Steam Seamanship. Wreck Lifting, Avoiding Collision, Wire Splic- ing, Displacement and everything necessary to be known by seamen of the present day. Second edition, illustrated.— John Todd and W. B. Whall	8 40
ELEMENTS OF NAVIGATION—Henderson	1 00	PRACTICAL SHIPBUILDING: A treatise on the structural design and building of modern steel vessels—By A. Campbell Holms— Two volumes	16 00
HAND BOOK OF ADMIRALTY LAW—Robt. M. Hughes....	3 75	RESISTANCE AND PROPULSION OF SHIPS—Durand.....	5 00
HINTS ON LEGAL DUTIES OF SHIPMASTERS—B. W. Gins- burg	1 75	SELF-INSTRUCTOR IN NAVIGATION AND PRACTICAL GUIDE to the examinations of the U. S. Government In- spectors for masters and mates of ocean-going steamships and sailing vessels—Capt. W. J. Smith. Second edition, revised and enlarged. Cloth bound	2 00
HOW TO BUILD A LAUNCH FROM PLANS—, with general instructions for the care and running of gas engines. Chas. G. Davis	1 50	SELF-INSTRUCTION IN THE PRACTICE AND THEORY OF NAVIGATION—Earl of Dunraven. Two volumes.....	7 00
ILLUSTRATED NAUTICAL ENCYCLOPEDIA—Howard Pat- terson	3 00	SHIP BUILDING—Tables for constructing ship's lines. Second edition. Archibald Hogg	2 00
INTERNATIONAL SIGNAL CODE—Bureau of Navigation. New edition	3 00	SIMPLE ELEMENTS OF NAVIGATION—Young. New second edition	2 00
KNOW YOUR OWN SHIP—Thos. Walton	2 50	SMALL YACHT CONSTRUCTION AND RIGGING—Linton Hope	3 00
MANUAL OF ALGEBRA—R. C. Buck. For the use, more es- pecially, of young sailors and officers in the merchant navy; numerous examples and exercises	1 50	STABILITY OF SHIPS—Sir E. J. Reed	8 40
MARINE INSURANCE—W. Gow	1 50	STEEL SHIPS: Their Construction and Maintenance. A man- ual for ship builders, ship superintendents, students and ma- rine engineers—Thos. Walton	5 50
MARINER'S COMPASS IN AN IRON SHIP: How to keep it efficient and use it intelligently—J. W. Dixon.....	1 00	TEXT BOOK OF NAVAL ARCHITECTURE—J. J. Welch	1 50
MODEL ENGINES AND SMALL BOATS—N. M. Hopkins. New methods of engine and boiler making; ship design and construction; fifty illustrations	1 25	TEXT BOOK OF SEAMANSHIP—Com. S. B. Luce. U. S. N. Equipping and handling of vessels under sail or steam....	10 00
MODERN SEAMANSHIP—Lieut. Com. Austin M. Knight, U. S. N. Adopted as the text book of the United States Naval Academy	6 00	THEORETICAL NAVAL ARCHITECTURE: A treatise on the calculation involved in naval design—Samuel J. P. Thearle. In two volumes	8 50
MODERN NAVIGATION: A text book of navigation and nautical astronomy suitable for the examinations of the royal navy and board of education—Wm. A. Hall.....	4 00	THEORETICAL NAVAL ARCHITECTURE—E. L. Attwood. Text book; 114 diagrams	2 50
MODERN PRACTICE OF SHIP BUILDING IN IRON AND STEEL—Samuel J. P. Thearle. Two volumes. Second edi- tion, revised and enlarged	5 25	"WRINKLES" IN PRACTICAL NAVIGATION. Ninth edition, revised. S. T. S. Lecky	8 40
NAVAL ARCHITECTURE—Cecil H. Peabody. Just published...	7 50	YACHT ETIQUETTE—Capt. Howard Patterson	1 00
NAVAL ARCHITECTURE: A manual on laying off iron and steel vessels—Thos. H. Watson. Valuable for naval architects as well as beginners in ship yards.....	5 00		
NAVAL ARCHITECTURE—Sir W. H. White. New edition. 760 pages	9 00		
NAVAL ARCHITECTS AND SHIPBUILDERS' POCKET BOOK—Clement Mackrow. Formulæ, rules and tables, and marine engineers' and surveyors' Handy Book of Reference. Eighth edition, revised and enlarged	5 00		
NAVIGATION SIMPLIFIED—C. E. McArthur. Containing all problems required for U. S. Local Inspector's Examination of Masters and Mates of seagoing vessels	1 00		

Sent to any address, carriage prepaid, at prices named. There is no book on Navigation, Marine Engineering, Ship Building, or the allied industries, that is not either published or for sale by the

MARINE REVIEW,

CLEVELAND, O.

Your Boilers Need Attention!

SCALE WILL FORM WHEN WATER IS EVAPORATED

DEARBORN FEED-WATER TREATMENT

PREVENTS SCALE

SPECIAL MARINE FORMULA

PRESERVES THE BOILERS

Agents at Lake Ports

DEARBORN DRUG & CHEMICAL WORKS

G. R. CARR, Mgr.
MARINE DEP'T.

15 Branch Offices in U. S.

27-34 Rialto Bldg., CHICAGO.

A boat painted white with

OXIDE OF ZINC

will remain white in all seas and all climates; and tints based on OXIDE OF ZINC will remain pure and unaltered. There is no other satisfactory white pigment for marine service.

FREE: Our Practical Pamphlets:

- "The Paint Question"
- "Paints in Architecture"
- "Specifications for Architects"
- "French Government Decrees"

The New Jersey Zinc Co.,

71 Broadway,
NEW YORK.

We do not grind zinc in oil. List of zinc paint manufacturers furnished on request.

THE ROBERTS

Safety Water Tube Boiler Co.

MANUFACTURERS OF

High Grade Marine Water Tube Boilers.

Generators of the Highest Quality of Steam.

Nearly 1500 in use.

Send for Circulars and Stock Sheet.

Works:

RED BANK, N. J.
Phone, 49 Red Bank.

Main Office:

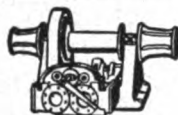
39 Cortlandt St.,
NEW YORK, N. Y., U. S. A.
Phone, 599 Cortlandt.

Cable Address:
"BRUNIVA."



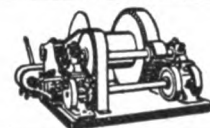
GASOLINE MARINE ENGINES

Suitable for all Boats from 3' to 200 HP.
Over 100 in successful use.
Also the well known and always
reliable Woolters Gas or Gasolene
Stationary Engines.



HOISTING ENGINES

Of all kinds and sizes, and
for all purposes, especially
for ship use.
Docking and Hauling Engines
and Wire Rope Windlasses.



AUTOMATIC TOWING MACHINES

Somewhat the cheapest, and
altogether the best. Positively
guaranteed.
Automatic Fog Whistle Machines
Steam Steering Engines.

FOR THESE AND OTHER WELL KNOWN SPECIALTIES ADDRESS ALL INQUIRIES TO.

THE CHASE MACHINE CO. Engineers and Machinists, CLEVELAND, OHIO.

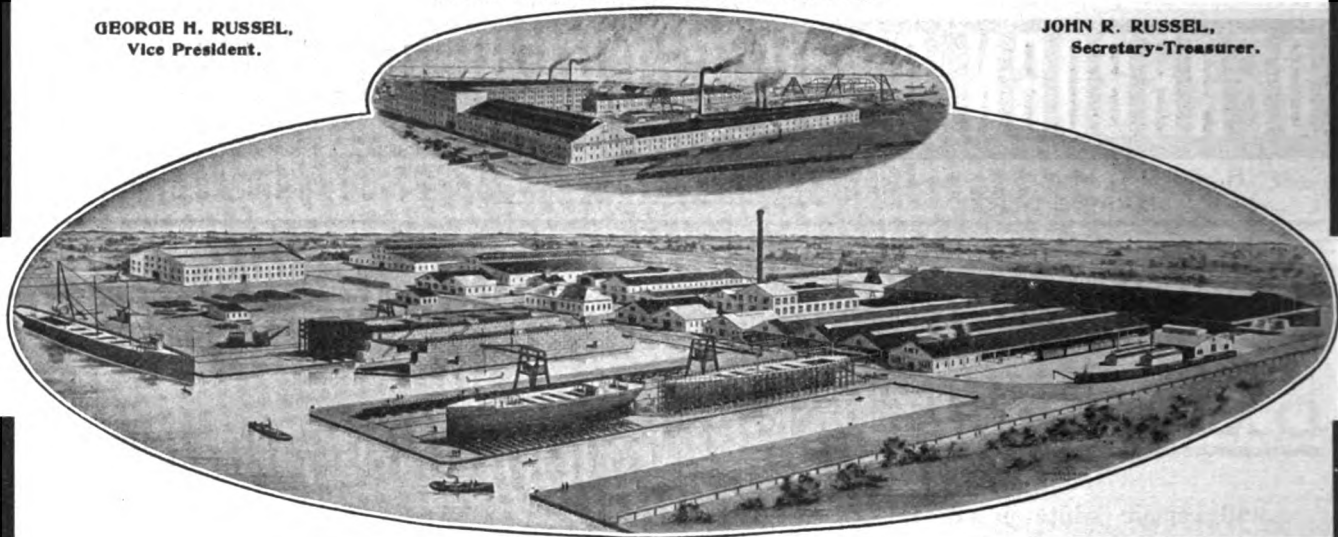
GREAT LAKES ENGINEERING WORKS

DETROIT, MICH.

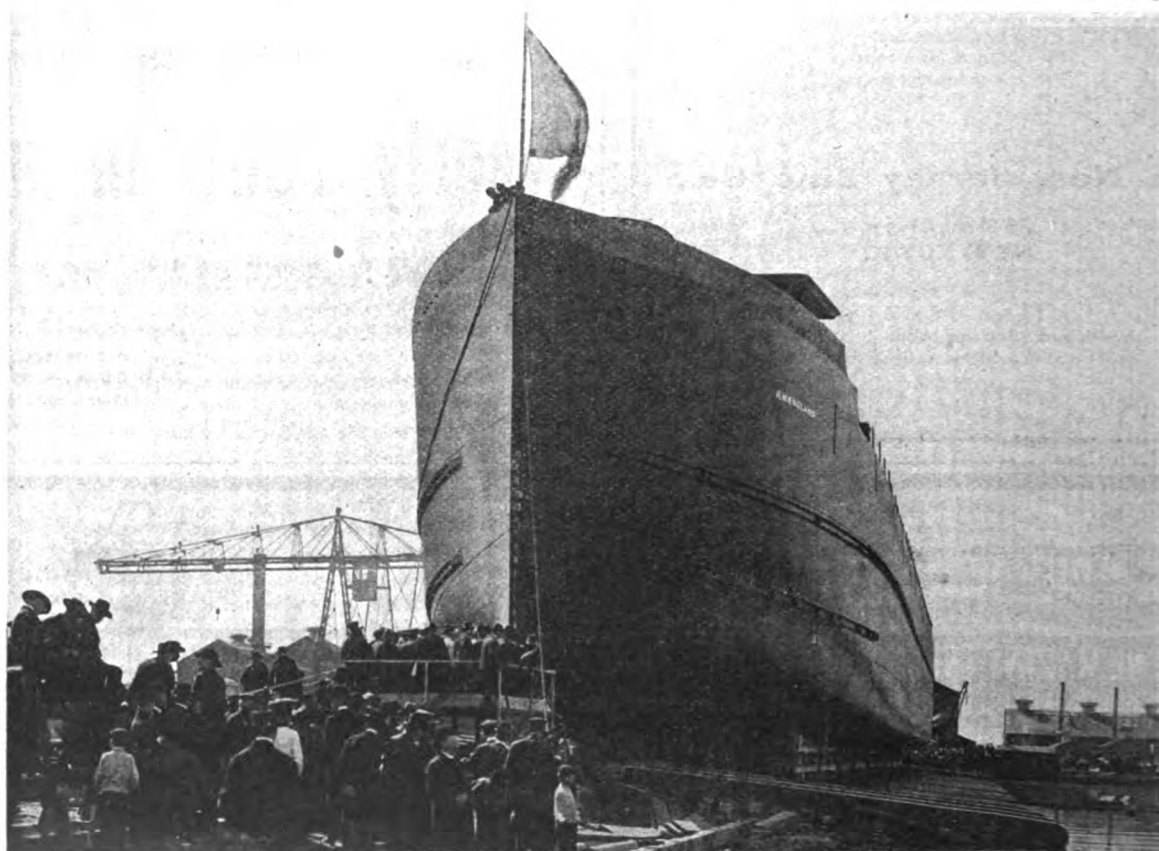
ANTONIO C. PESSANO, President and Gen. Mgr.

GEORGE H. RUSSEL,
Vice President.

JOHN R. RUSSEL,
Secretary-Treasurer.



**Designers and Builders of
Steel Freight and Passenger Ships.
Marine Engines. = Hydraulic Dredges.**



Marine Repairs a Specialty.

BELLEVILLE WATER-TUBE BOILERS

NOW IN USE (MARCH, 1904)

On Board Sea-going Vessels, NOT INCLUDING New Installations Building or Erecting.

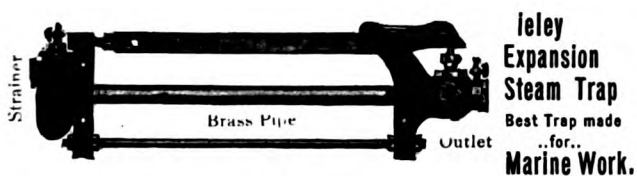
French Navy	-	-	-	-	-	-	-	-	355,560	H. P.
English Royal Navy	-	-	-	-	-	-	-	-	966,300	"
Russian Imperial Navy	-	-	-	-	-	-	-	-	224,500	"
Japanese Imperial Navy	-	-	-	-	-	-	-	-	122,700	"
Austrian Imperial Navy	-	-	-	-	-	-	-	-	56,700	"
Italian Royal Navy	-	-	-	-	-	-	-	-	13,500	"
Chilian Navy	-	-	-	-	-	-	-	-	26,500	"
Argentine Navy	-	-	-	-	-	-	-	-	13,000	"
The "Messageries Maritimes" Company	-	-	-	-	-	-	-	-	87,600	"
Chemins de fer de l'Ouest: (The French Western Railway Co.)	-	-	-	-	-	-	-	-	18,500	"
plying between Dieppe and Newhaven	-	-	-	-	-	-	-	-		
Total Horse Power of Boilers <u>in Use</u>	-	-	-	-	-	-	-	-	1,884,860	

Société Anonyme des Etablissements Delaunay Belleville

CAPITAL: 6,000,000 FRANCS

Works and Dock Yards of the Ermitage at Saint-Denis (Seine), France.

Telegraphic Address: Belleville, Saint-Denis-Sur-Seine



Good for any pressure. Valve opens full area.

Also Reducing Valves, Steam Separators and Open Float

Traps for Marine Purposes.

Write for Catalogue.

SENT ON TRAIL.

KIELEY & MUELLER, 34 West Thirteenth Street, NEW YORK CITY.

THOMAS WALKER & SON, BIRMINGHAM, ENGLAND.

THE
"NEPTUNE"
SHIP-LOG

With
Ball Bearings
for

HIGH
SPEEDS.

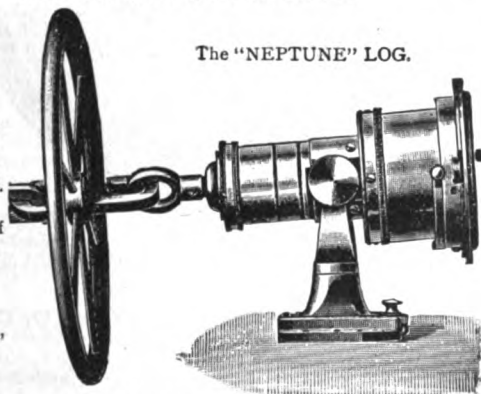
Also makers of
the

"CHERUB"

and

"HARPOON"
SHIP-LOGS.

The "NEPTUNE" LOG.



MAKERS TO THE BRITISH NAVY.

ASHTON

**Cam Lever Pop Safety Valves
and Non-Corrosive
Steam Gauges.**

give highest efficiency and durability.
Specify them and get the best.

The Ashton Valve Co.
Boston New York Chicago
U. S. A.

CLIMAX RIVETS

for
Plate and Sheet Work
all sizes

WRITE FOR PRICES

**THE
BOURNE-FULLER CO.**
IRON, STEEL
PIG IRON
COKE

Cleveland, Ohio

PRACTICAL SHIPBUILDING:

A Treatise on the Structural Design and Building of Modern Steel Vessels. The Work of Construction, from the Making of the Raw Material to the Equipped Vessel, including Subsequent Upkeep and Repairs.

By A. CAMPBELL HOLMS,

Member of the Institution of Naval Architects and of the Institution of Engineers and Shipbuilders in Scotland; Surveyor to Lloyd's Register of Shipping. 2 vols. (Vol. I., Text. Medium 8vo. Vol. II., Diagrams and Illustrations. Oblong 4to.)

The plan of the book is briefly as follows: First, attention is given to the fundamental matters which govern the structural design; the various stresses to which the hull is exposed, their straining tendency, and the different structural designs by which the necessary strength to resist them may be secured. Secondly, each important part of the hull is considered by itself, and each one from three points of view viz., its purpose in the structure and the particular stresses and straining effects to which it is liable; the various formations adopted in its design, with the rules governing them as regards scantlings and strength; and a description of the actual work of making it in a shipyard and fitting it to the ship. As a description of the actual work of the shipyard is reading of a special character, it is dealt with separately in the second part of the book, the sequence generally being thus better preserved.

\$16.00, *EXPRESSAGE EXTRA.*

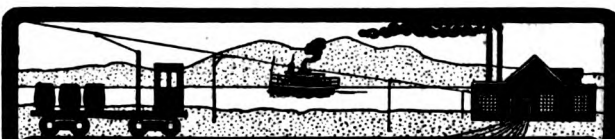
PENTON PUBLISHING COMPANY

::

::

::

WADE BUILDING, CLEVELAND.



Technical Office of Le Mois Scientifique et Industriel.

8 Rue Nouvelle, Paris (9e).

We have with our collaborators opened an office to supply answers on all scientific, mining, technical and bibliographical studies or practical questions. We help *industrials* who have opened new enterprises, *professors* who must resolve unfamiliar problems, *lecturers*, *teachers*, *students*, etc. We furnish a complete course, detailed bibliographical work, complete study, cost prices, plans, drawings, illustrations, projections, etc.

ASK FOR SPECIAL NOTICE.

Add 4 cents for postage.

Short Delays for Answers. The Terms are very moderate

7,000,000 CARD'S INDEX.

"STANDARD" SELF CONTAINED AUXILIARY SPRING GAUGE

with **INDEPENDENT** movement.

We claim particular merit for this type of gauge in connection with Marine, Locomotive and High Pressure Boiler Service, and they are guaranteed to give satisfaction under the most exacting requirements.

Material used by us in mechanism is selected for its superior wearing qualities and will outwear two gauges made from stock generally used. Our gauges are provided with either silvered, white enamel or black dials guaranteed accurate with U. S. Government Standard Open Mercury Column.



Send for Catalogue No. 17, which illustrates Pressure and Vacuum Gauges for every purpose. Engine Counters, Marine Clocks, Recording Gauges, etc.

MANUFACTURED BY

STANDARD GAUGE MFG. CO.

Syracuse, N. Y.

Branches: 141 Broadway, New York. 58 W. Washington St., Chicago.

Pacific Coast Agents: Geo. H. Tay Company,
San Francisco and Los Angeles, Cal., Seattle, Wash.

WANTED and FOR SALE Department.

FOR SALE.

For Sale—A Bargain \$20,000.

Steamer Gordon Campbell Cost over \$10,000 to dry dock and rebuild within last year. Original cost \$100,000. A2 wooden steamer, first-class condition; 206 ft long, 33 ft beam; two decks and gangways; top deck 113 ft. clear between cabins. Boilers, engines, etc., in first-class condition. Can carry grain, package freight, coal, ties, etc. Package freight and boom hoist. \$1,000 would cut her down for lumber. Can be seen at Chicago. Address M. F. Care, 511-59 Dearborn St. Chicago tf

Fish Tug.

For Sale Cheap—Fish tug H. M. Van Ells Engine, 14x16; boiler, 5x11 ft; 100 lbs steam. Apply to Martin Hermann, 418 Clinton St., Milwaukee, Wis Oct 20

Submarine Drill Boat for Sale.

New submarine drill boat for sale. Hull 72 ft. by 24 ft., 5 ft. sides. Enquire of Hickler Bros., 4400 Ste. Marie, Mich. tf

For Sale at \$8 Each.

Three Neafie & Levy made for power propeller wheels, 4 ft 6 in. diameter, with 4 in., 4 3/8 in and 3 3/8 in bore for shafts. Address Bart E. Linehan, Du-buque, Ia. Oct. 20

FOR SALE.

For Sale or Trade.

Freight and passenger steamer for sale or will trade for one somewhat larger. Licensed to carry 279 passengers and is of 257 gross tons; 134 ft. long, 27 ft beam and 7 ft deep. Rated A1 1/2. Well fitted for accommodation of passengers and for handling of freight. Speed 12 to 13 miles per hour. Address Box 72, Marine Review, Cleveland. Oct. 27

WANTED.

Excursion Steamer Wanted.

To purchase a small steamer for river excursion business. Must carry not less than 300 passengers and have 12 miles an hour speed. Canadian bottom preferred. Address R. W. Wright, 883 North Clark St., Chicago, Ill. Oct. 12

Steam Barge Wanted.

Wanted—Small steam barge and excursion steamer for Chicago improved real estate and cash. Address Box 74, Marine Review Cleveland Oct. 27

U. S. Engineer Office, 1637 Indiana Ave., Chicago, Ill., Sept. 26, 1904. Sealed proposals for rebuilding superstructure and laying new decking in Calumet Harbor, Ill., will be received here until noon, Nov. 4, 1904, and then publicly opened. Information on application. O. H. Ernst. Col. Engrs. Oct. 27

If You Want to Buy or Sell

Second Hand

Anchors, Anchor Chains, Boilers, Buoys, Capstans, Clam Shell Buckets, Compasses, Concrete Mixers, Cranes, Dead Lights, Derricks, Divers' Suits, Electrical Apparatus, Engine Room Signals, Engines, Gasoline Launches, Hoisting Engines, Hoists, Life Boats, Life Rafts, Lighters, Logs, Propellers, Sail Boats, Schooners, Search Lights, Steamboats, Steam Steering Apparatus, Steam Yachts, Towing Machines, Tugs, Windlass,

patronize the "FOR SALE" and "WANTED" columns of the

MARINE REVIEW.

Costs only \$1 per inch per issue. Issued every week. Goes everywhere. Will do the business for you. Brings returns.

SMOOTH-ON

Every Engineer should have our new 100 page illustrated book — sent free — send for it now.

SMOOTH-ON MANUFACTURING CO., Jersey City, N. J., U.S.A.
Chicago Office, 61 N. Jefferson Street.

THE MOST CONVENIENT TRAIN

From Cleveland to New York is "The New York Special" via Pennsylvania Lines. It leaves Cleveland daily at 5:30 p. m. from Union Station, and 5:10 p. m. from Euclid Avenue Station, arriving in New York at 8:15 the following morning.

Through drawing sleepers are carried on this train from Cleveland to New York and Cleveland to Philadelphia without change; and Cafe car Cleveland to Pittsburg, serving supper on a-la-carte plan. New York tickets via direct route are available for ten days stopover at Philadelphia, and tickets to New York are sold at Short Line rate via Washington on which a stopover of ten days is allowed at Baltimore, Washington and Philadelphia.

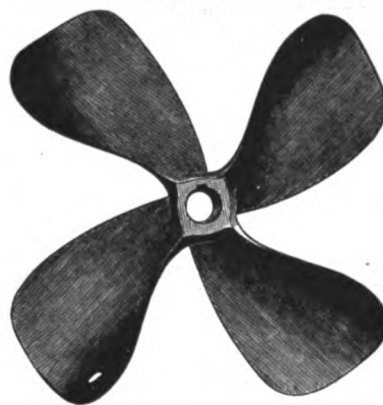
Remember that the Pennsylvania Lines have the shortest route from Cleveland to New York. For tickets and Pullman space apply to City Ticket Office, No. 1 Euclid Avenue, or Euclid Avenue Station, or write

GEO. W. WEEDON, D. P. A.

Oct. 27

Cleveland.

Thirty Years' Experience building



Engines
and
Propeller
Wheels.

H. G. TROUT,
King Iron Works,
226 Ohio St.,
BUFFALO, N. Y.



ESTABLISHED 1854

SHERIFFS'
STEAM
STEERER

For Tug Boat Use

Easy to adjust, and can be handled by any one.

MANUFACTURED BY
SHERIFFS MFG. CO.,
Milwaukee, Wis.



THE CLEVELAND & BUFFALO TRANSIT COMPANY.

UNPARALLELED NIGHT SERVICE.

NEW STEAMERS "CITY OF BUFFALO" AND "CITY OF ERIE"

Both together being, without doubt, in all respects the finest and fastest that are run in the interest of the traveling public in the United States.

TIME CARD.—DAILY INCLUDING SUNDAY. CENTRAL STANDARD TIME.

Leave CLEVELAND 8 p. m. Arrive BUFFALO 6:30 a. m.

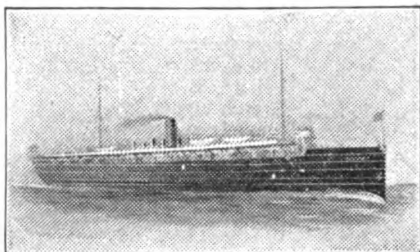
" BUFFALO 8 p. m. " CLEVELAND 6:30 a. m.

ORCHESTRA ACCOMPANIES EACH STEAMER.

Connections made at Buffalo with trains for all Eastern and Canadian points; at Cleveland for Toledo, Detroit and all points West and Southwest. Tickets reading over L. S. & M. S. Ry. will be accepted on this Company's Steamers without extra charge. Special Low Rates Cleveland to Buffalo and Niagara Falls every Saturday Night, also Buffalo to Cleveland. Ask Ticket Agents for tickets via C. & B. Line. Send four cents for illustrated pamphlet.

W. F. HERMAN, G. P. A., Cleveland, O.

Northern Michigan Transportation Co.



Chicago,
Ludington,
Manistee,
Charlevoix,
Petoskey,
Harbor
Springs,
Mackinac
Island.

STEAMSHIPS MISSOURI, ILLINOIS and KANSAS.

Our 1904 Booklet mailed free on application. Address,

R. F. CHURCH, G. P. A. - Chicago.

United Fruit Co's Steamship Lines

CARRYING FAST UNITED STATES AND FOREIGN MAILS.

First-Class Passenger Service to Jamaica

Weekly Sailings from

BOSTON, PHILADELPHIA and BALTIMORE

Fare One Way, \$40.00—Round Trip, \$75.00

For full information apply to

DIVISION PASSENGER AGENT

At either port.

Manitou Steamship Co.,

"The Mackinac Line."

In service the famous steel constructed
STEAMSHIP MANITOU.

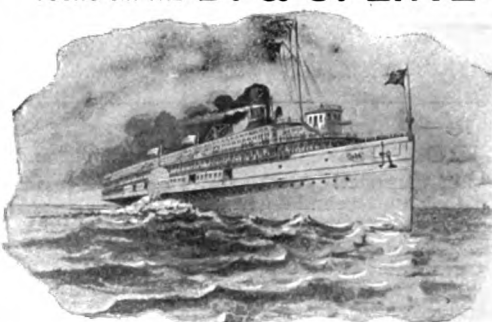
Three times each week between Chicago, Frankfort, Northport,
Charlevoix, Petoskey, Harbor Springs and Mackinac Island.

Passenger Service Exclusively.

Illustrated booklets, route and rate books, containing about
200 different combination tours to select from, mailed free for
the asking. Address

JOS. BEROLZHEIM, G. P. A., Chicago.

REFRESHING LAKE TOURS VIA THE D. & C. LINE STEAMERS.



FOUR TRIPS
PER WEEK
BETWEEN
TOLEDO
AND
MACKINAC.

DAY AND
NIGHT
TRIPS
BETWEEN
CLEVELAND
AND
DETROIT.

FOR PARTICULARS, ADDRESS

A. A. SCHANTZ, GEN. SUPT. AND P.T.M., DETROIT MICH.

GOODRICH
LINE
STEAMERS

NINE BOATS.

Passenger and freight service between Chicago, Milwaukee, Racine, Sheboygan, Manitowoc, Green Bay Ports, Grand Haven and Muskegon.

H. W. THORP,
Gen'l Mgr.

R. C. DAVIS,
G. P. A.

General Office: CHICAGO, ILL.

The Niagara, St. Catharines & Toronto Railway & Navigation Co.

First class Passenger Service
between Toronto, Niagara Falls, N. Y.
and Buffalo.

Fast Freight Service to all points.

FOR FURTHER INFORMATION APPLY TO

H. DAVIS, G. P. A.

W. N. WARBURTON, G. F. A.

E. F. SEIXAS, GEN. MGR.

The Erie & Western Trans. Co.

ANCHOR LINE.

PASSENGER SERVICE Steamers.

India.	China.	Japan.	Tionesta.
Buffalo.	Erie.	PORTS OF CALL.	Cleveland.
Detroit.	Mackinac Island.		Sault Ste. Marie.
Marquette.	Houghton.		Hancock.
	Duluth.		

FREIGHT SERVICE Steamers.

Alaska.	Codorus.	Mahoning.	Schuylkill.	Conestoga.
Muncy.	Clarion.	Delaware.	Juniata.	Lehigh.
Lycoming.	Susquehanna.	Wissahickon.		Conemaugh.
	PORTS OF CALL.			
Buffalo.	Erie.	Cleveland.		Detroit.
Sault Ste. Marie.	Marquette.	Houghton.		Hancock.
Duluth.	W. Superior	Chicago.		Milwaukee.

J. C. Evans,
Western Manager,
BUFFALO, N. Y.

Chas. E. Markham,
General Passenger Agent,
BUFFALO, N. Y.

WARD LINE

THE NEW YORK & CUBA MAIL
STEAMSHIP CO.

POPULAR ROUTE TO

CUBA, NASSAU, MEXICO

FINEST AND LARGEST STEAMSHIPS SAILING
FROM NEW YORK TO OTHER THAN EUROPEAN
PORTS. HOLDERS OF THE RECORD BETWEEN
HAVANA AND NEW YORK -- 1,240 MILES IN 61
HOURS.

FOUR SAILINGS EACH WEEK BETWEEN
NEW YORK and HAVANA.

WEEKLY SERVICE TO GUANTANAMO, SANTIAGO, MANZANILLO
AND CIENFUEGOS, CUBA, PROGRESO, VERA CRUZ
AND TAMPICO, MEXICO.

SEMI-MONTHLY SAILINGS TO
Nassau, N. P. Bahamas.

LOW RATES OF FREIGHT AND PASSAGE.

SEND FOR OUR SCHEDULES, RATES AND DESCRIPTIVE MATTER.

James E. Ward & Co.

GENERAL AGENTS

90 Wall Street, NEW YORK.

AMERICAN LINE

PLYMOUTH
CHERBOURG
SOUTHAMPTON

Sailing From New York Every Saturday at 9:30 a. m.

St. Louis
(11,629 tons)
New York
(10,798 tons)

St. Paul
(11,629 tons)
Philadelphia
(10,786 tons)

Special Express Train from Plymouth and Southampton
to London and between Cherbourg and Paris.

RED STAR LINE

NEW YORK
ANTWERP
LONDON
PARIS

CALLING AT DOVER FOR LONDON AND PARIS.
Sailing Every Saturday at 10:30 a. m.

Finland
(12,760 tons)
Vaderland
(12,017 tons)

Kroonland
(12,760 tons)
Zeeland
(11,905 tons)

One of the Shortest Routes to LONDON, PARIS, BELGIUM, HOL-
LAND, GERMANY, THE RHINE, SWITZERLAND and ITALY.

9 Broadway, New York.

Broad and Sansom Sts., Philadelphia.
India Building, 84 State Street, Boston.
1806 F St., N. W., Washington, D. C.
219 St. Charles St., New Orleans
90-98 Dearborn St., Chicago.
Century Building St., Louis.
Guaranty Building, S., Minneapolis.
21 Post St., San Francisco.
875 Robert St., St. Paul.
41 King St., East Toronto.
17 St. Sacramento St., Montreal.

PIERS: 14 & 15 NORTH

RIVER, FOOT OF FUL-

TON ST., NEW YORK.

Mexican - American Steamship Co.,

The Rail and Water Route to Mexico,
via New Orleans, La., and Galveston,
Texas.

A. L. ROBY,
Vice Pres't and Mgr.
NEW ORLEANS, LA.

F. N. LUFKIN,
Sec'y and Treas.
NEW ORLEANS, LA.

General Offices: 1101 Hibernian Bank Bldg.
New Orleans, La.

New Orleans-Tampico-Vera Cruz Line

S. S. NOR.

S. S. NORHEIM.

Freight and passenger sailings every
two weeks, connecting with all rail-
ways from Tampico and Vera Cruz
for interior points.

W. H. BATES, Agent, New Orleans, La.

GALVESTON - TAMPICO LINE

S. S. IRIS.

S. S. FARMAND.

Weekly Sailings.

Fast freight service from the United States
to Mexico, via Galveston at Tampico, con-
necting at Tampico with the Mexican
Central Railway for all interior points.

W. H. RICHARDSON, Agent, Galveston, Texas.

BOSTON STEAMSHIP CO.

S. S. "SHAWMUT" S. S. "TREMONT" S. S. "LYRA"

Japan, South China and Manila Steamship Line

Operated in connection with the

**Northern Pacific and Great Northern
Railway Companies.**

Monthly Passenger and Freight Service from
Tacoma and Seattle, Washington.

New Twin-screw American Steamships of
10,000 tons register. Exceptionally large
staterooms, all outside.

OWING TO THE GREAT SIZE OF THE SHIPS,
AND THE IMMENSE CARGOES CARRIED IT HAS
NEVER BEEN NECESSARY TO USE RACKS ON
THE DINING TABLES.

Rates at any office of

NORTHERN PACIFIC RAILWAY,
GREAT NORTHERN RAILWAY,
CHICAGO, BURLINGTON & QUINCY RAILWAY,
THOMAS COOK & SONS, Tourists Agents.

A. WINSOR, PRES.
Boston, Mass.

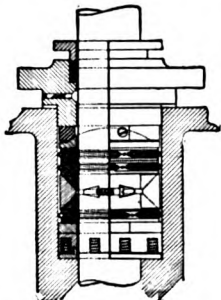
F. WATERHOUSE, AGENT,
Seattle, Wash.

STAR CONDENSER PACKING TOOL.

J. H. Schlosser
Patent.

Manufactured for
5/8-in., 3/4-in. and
7/8-in. tubes.

This tool effects a saving of from 50 to 60 per cent. over hand work and any other tool.
Exclusively Manufactured by **MATTESON & DRAKE, 706-707 Bourse, PHILADELPHIA.**



Katzenstein's Self-Acting Metal Packing

For PISTON RODS, VALVE STEMS, etc. of every description for Steam Engines, Pumps, etc., etc. Adopted and in use by the principal Iron Works and Steamship Companies in this and foreign countries.

FLEXIBLE TUBULAR METALLIC PACKING, for slip-joints on Steam Pipes, and for Hydraulic Pressure; also METAL GASKETS for all kinds of flanges and joints.

For full particulars and reference, address

L. KATZENSTEIN & CO.

GENERAL MACHINISTS, BRASS FINISHERS, ENGINEERS' SUPPLIES.
358 West street, New York.

RELIANCE MFG. CO.

MARINE GASOLINE ENGINES 4 to 150 H.P.,
2 to 6 cylinders. Lightest weight. Simplest. Highest
Efficiency. :: :: Special Designs for Auto Boats.

PROVIDENCE, R. I.

THOS. DREIN & SON.

TATNALL ST. BELOW RAILROAD, WILMINGTON, DEL.



BUILDERS OF METALLIC LIFE
BOATS AND RAFTS, YACHTS
AND PLEASURE BOATS.

LIFE PRESERVERS.

OUTFIT FOR LAKE STEAMERS
A SPECIALTY.

•Neversink Cork Jackets and Life Belt.

Warranted 24 pounds. Buoyancy and full weight of Cork, as required
by U. S. Inspectors.

Consolidated Cork Life Preservers. Ring Buoys and Fenders.

SAFEST.

CHEAPEST.

Approved and adopted by U. S. Board of Supervising Inspectors. Also adopted by the principal Ocean, Lake and River Steamer Lines as the only Reliable Life Preserver. Awarded four Medals by World's Columbian Exposition.



METALLIC
and
WOODEN
LIFE
BOATS.



Metallic Life Rafts. Marine Drags.

Manufacturers of Woolsey's Patent Life Buoy—the
lightest, cheapest and most compact life raft known.

DAVID KAHNWEILER'S SONS.

437 Pearl Street, New York City.

Send for Illustrated Catalogue.

PHOSPHOR BRONZE.

REG. TRADE MARKS



THE PHOSPHOR BRONZE SMELTING CO. LIMITED,
2200 WASHINGTON AVE. PHILADELPHIA.

"ELEPHANT BRAND PHOSPHOR-BRONZE"

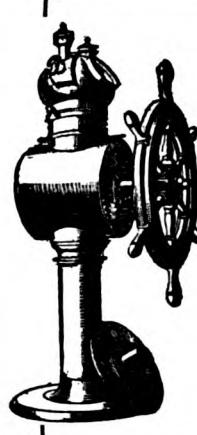
INGOTS, CASTINGS, WIRE RODS, SHEETS, ETC.

— DELTA METAL —

CASTINGS, STAMPINGS AND FORGINGS.

ORIGINAL AND SOLE MAKERS IN THE U. S.

DELTA METAL

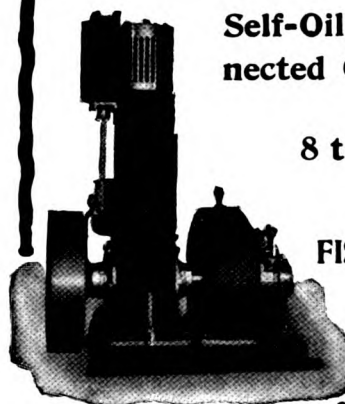


Marine Manfg. & Supply Co.,

157 and 158 South St.,
New York.

Ship Fittings and Supplies,
Capstans, Windlasses, Steering
Apparatus, Engine Room Tele-
graphs, Brass Air Ports,
Dead Lights, Pumps, etc.

Catalogue A—Air Ports, Ventilators, etc.
Catalogue B—Windlasses, Pumps, etc.
Catalogue C—Steering Apparatus.
Others in course of preparation.



Self-Oiling, Direct Con- nected Generating Sets

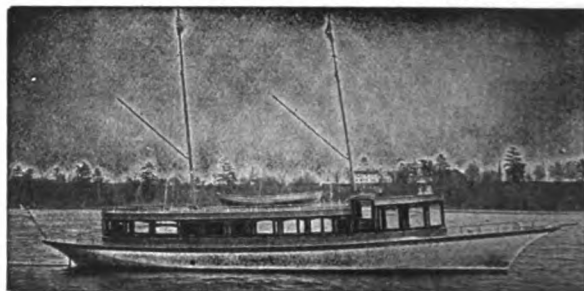
from

8 to 25 K. W.

**FISHER ELECTRICAL
WORKS,**

DETROIT, MICH.

A TRUSCOTT BOAT.



SIMPLE. SAFE. SPEEDY. RELIABLE.

It may be possible to build better and safer
boats but it hasn't been done yet. We send a
completely illustrated catalogue and price list
free, which tells you all about boats and why
Truscott Boats Excel.

TRUSCOTT BOAT MFG. CO.

ST. JOSEPH,
MICH.

British Admiralty Charts

The latest Editions of Charts,
Plans and Sailing Directions
Published by the British Ad-

miralty. Can be obtained from
Admiralty Agent by Appointment.

J. D. POTTER,

145 MINORIES, LONDON, ENGLAND.

OFFICIAL CATALOGUE OF CHARTS (380 pages) is.

An Abridged Catalogue of Charts of Nautical Books (free on application.)

Thearle's Works on Ship Building.

STANDARDS IN ENGLAND AND SCOTLAND.

KNOWN AND USED WHEREVER STEEL SHIPS ARE BUILT.

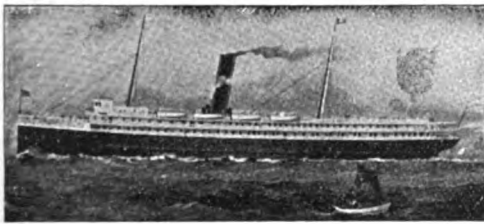
SEPARATE VOLUMES FOR PLATES.

"Ship Building in Iron and Steel." (Plates in separate volume.) \$5.25.

"Theoretical Naval Architecture." (Plates in separate volume.) \$3.50.

THE PENTON PUBLISHING CO.,
Cleveland, O.

ROACH'S SHIP YARD.



Ship
Building
in all its
Branches

Builders of
STEAMSHIP AND MARINE MACHINERY.

Delaware River Iron Ship Building & Engine Works,
Chester, Pa.

The Atlantic Works, EAST BOSTON, Massachusetts.

BUILDERS OF

Steamships, Steam Yachts, Tow Boats, Etc.

Marine Engines, Boilers and Tanks.
Heavy Machinery and Plate Iron Work.

THREE MARINE RAILWAYS.

PRESERVE your copy of the MARINE REVIEW by binding it each week into the "Emerson Binder." Copies for a full year can be inserted in one binder.

These binders mailed to any address upon receipt of \$1.

MARINE REVIEW

CLEVELAND, OHIO

FORE RIVER SHIPBUILDING CO.

Steel Ship and Marine Engine Builders.

CONTRACTORS FOR

U. S. Torpedo Boat Destroyers Lawrence and Macdonough.
U. S. Protected Cruiser Des Moines.
U. S. Battleships New Jersey and Rhode Island.
U. S. Steam Light-Vessel No. 72.

Office and Works, - - QUINCY, MASS., U. S. A.

The Lockwood Manufacturing Co.

EAST BOSTON, MASS.

ENGINEERS AND MACHINISTS.

Builders of Steamships, Tow Boats and Marine Engines.

Repairing of Hulls and Machinery.

W. & A. FLETCHER CO.

NORTH RIVER IRON WORKS.

MARINE ENGINES, BOILERS, Etc.

Hudson, 12th and 14th Sts., HOBOKEN, N. J.

Take Ferry from foot of West 14th St., N. Y.

THE SHIPOWNERS DRY DOCK CO.

CHICAGO, ILL.

Building and Repairing of Steel and Wooden Ships with economy and dispatch.

Yard and Dry Docks: Halstead St. and North Branch.
Largest Dry Dock: 480 ft. on keel blocks.

Office, 381 No. Halstead St. Phone, North 1658.

MANITOWOC DRY DOCK COMPANY.

SHIP BUILDERS

Facilities for Repairs to Steel and Wooden Vessels.

MANITOWOC

WIS.

Chicago Nautical School, Ninth Year.

MASONIC TEMPLE, CHICAGO.

W. J. WILSON, Principal, (late Lieutenant, U. S. N.)



A full and complete course of instruction in Lake and Ocean Navigation and Marine Engineering. Also special branches taught those desiring to qualify themselves for better positions in the Marine Service. Students taught by correspondence. Students may begin at any time. Diplomas will be issued to all graduates passing satisfactory final examinations. Candidates prepared for Annapolis.

SEND FOR CIRCULAR.

The Allen Dense-Air Ice Machine

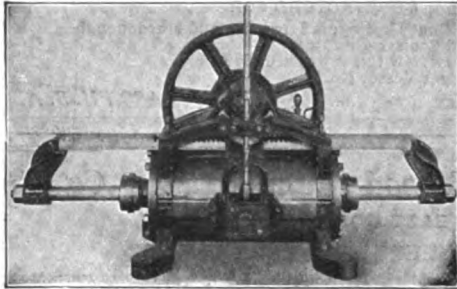
Contains no chemicals, only air. Proven by many years' service in the tropics on United States men-of-war, steam yachts and passenger steamers.

A HUNDRED ARE IN DAILY SERVICE ON STEAMERS.

H. B. ROELKER, 41 Maiden Lane, NEW YORK
Consulting and Constructing Engineer. Designer and Manufacturer of Screw Propellers.

ICE-CRUSHING CAR FERRIES OF THE GREAT LAKES.

Complete Structural Description with Line Drawings and Photos of the Various Types in the Ship Building Edition of Marine Review. Price 25 cents.

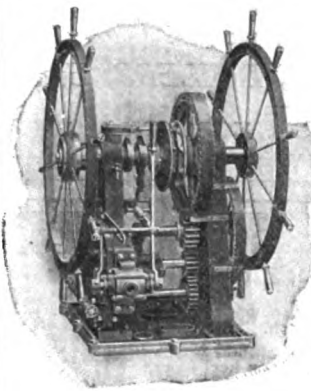
A STEAM STEERER

**DIRECT
—and—
POSITIVE**
QUICK ACTING.

Especially adapted for
Steam Yachts,
Ferryboats,
Lake, Ocean
and Harbor
Tug Boats.

Send for Catalogue and
Particulars.

**MOULTON STEERING ENGINE CO., 17 STATE STREET,
NEW YORK CITY.**



**THE
Dake Pilot House
Steam Steerer.**

A Simple, Compact and
Durable Machine.
Occupies Small Floor Space.

Write for descriptive
circulars and prices.

MANUFACTURED BY
The Dake Engine Co.
GRAND HAVEN, MICH.



Makers of only the Highest Qualities of Staybolt Material, in Hollow and Solid Bars, from the Best Double-Refined Charcoal Iron or Steel.

THE FALLS HOLLOW STAYBOLT IRON Is the only Elastic Staybolt in the World.

The Only Staybolt Iron which responds in service to the expansion and contraction of fire box; which relieves the material in molecular strains; which is self protective from burning; which does not make the side sheets crack; which earns its own cost in oxygen through it to the fire; always sure in giving warning of breakage.

The Staybolt which lasts longest, causes least repairs, gives longest life to the fire box, and the longest service in the engine on the rails.

In use by Leading Railways of the United States, Canada, Mexico, Japan and Norway. Also by Marine Engineers and the United States Government. And by the Manufacturers of Mining Drills and by others requiring absolutely reliable material.



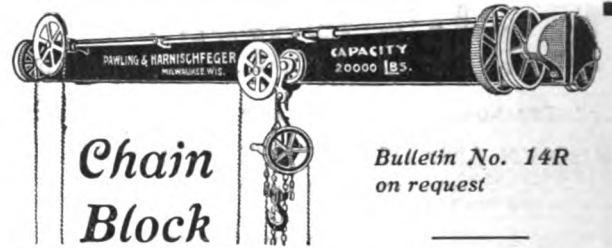
One of these
binders, that
will hold

52 ISSUES
of the

Marine Review
will be mailed
to any address
on receipt of

\$1.

**MARINE REVIEW,
CLEVELAND, O.**

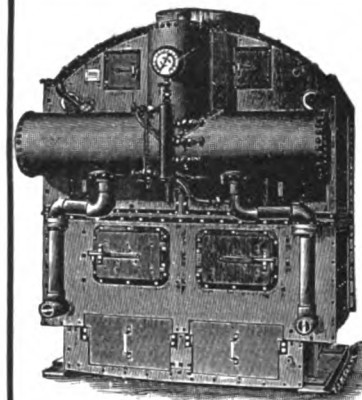


**Chain
Block**

Bulletin No. 14R
on request

**TRAVELING
CRANES**

**PAWLING &
HARNISCHFEGER**
Clinton and South
Water Streets, MIL-
WAUKEE, WIS.,
U. S. A.



**250 STEAM
VESSELS**

Now Equipped With

**ALMY'S PATENT
SECTIONAL**

Water Tube Boilers

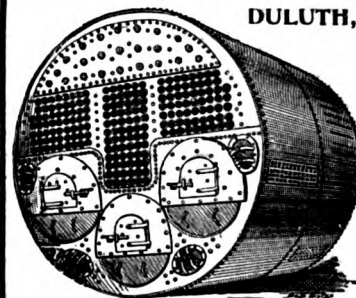
Bear Evidence of Their

Excellent Qualities

**Almy Water-Tube
Boiler Co.**

PROVIDENCE, R. I.

Northwestern Steam Boiler & Mfg. Co.
DULUTH, MINN.



Manufacturers of

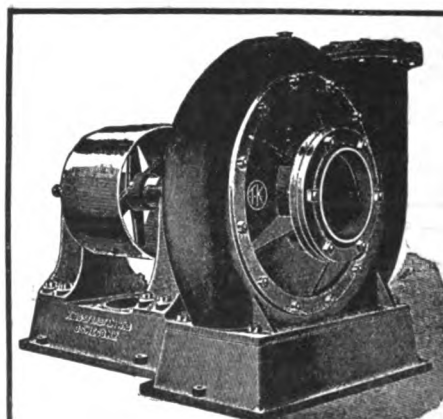
**BOILERS, ENGINES
AND MACHINERY**

Special facilities for Marine
Work. Repairs promptly
attended to Night or Day.

We carry a complete
line of Marine and
Engineers' Supplies.

TELEPHONES: OFFICE AND WORKS, 615.

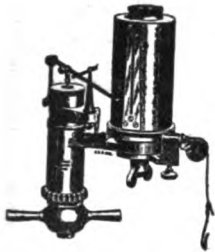
RESIDENCE CALLS: M. A. P. VAN, Pres. and Gen'l Mgr., 776-R;
J. H. OPPERMAN, Secretary, 579-R; E. KRIZ, Superintendent, 557-M.



Dredging,
Wrecking,
Circulating
and Ballast
PUMPS

**Marine
Boilers.**

**Kingsford
Foundry
& Machine
Works,**
Oswego, N. Y.



SEND AT
ONCE FOR
CATALOG

AMERICAN

THOMPSON IMPROVED INDICA-
TOR with NEW DETENT MOTION.

DO NOT let this IMPROVEMENT
ESCAPE YOUR ATTENTION.

INDICATORS THAT INDICATE
GAUGES THAT GAUGE
POPS THAT POP

AMERICAN STEAM GAUGE & VALVE MFG. CO.

NEW YORK.

BOSTON.

CHICAGO.

Time and Distance Tables for Lake Ships

A set of tables showing the time required at different rates of speed, 8 to 15 miles an hour, to cover distances between all ports on the Great Lakes. A time saver to the vessel owner or vessel agent as well as captain or engineer. Send for it on approval.

Price \$1.00

MARINE REVIEW,

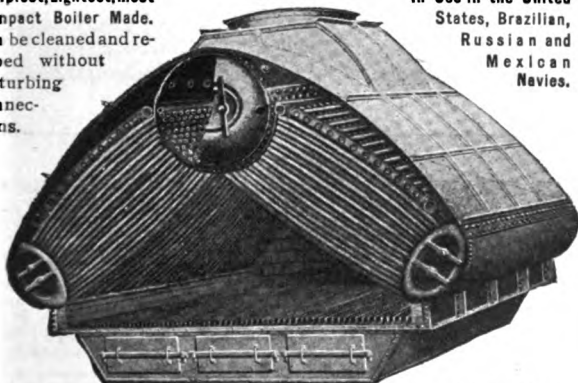
Cleveland, Ohio

THE MOSHER PATENT WATER TUBE BOILER,

Simplest, Lightest, most
Compact Boiler Made.
can be cleaned and re-
tubed without
disturbing
connec-
tions.

TYPE A.

In Use in the United
States, Brazilian,
Russian and
Mexican
Navies.



As many as forty tubes can be cleaned or renewed through a single hand-hole; has greater steam and water capacity than any other water tube boiler. Send for descriptive catalogue.

MOSHER WATERTUBE BOILER CO., NO. 1 BROADWAY, N. Y.

Motor Boat and Sportsman's Show

Madison Square Garden
New York City

February 21 to March 9, 1905

Address, J. A. H. DRESSEL, 1135 B'way, N. Y.

DON'T
MISS
THIS.

Westinghouse Motors.

For All Power Purposes.

Alternating
Current.



Direct
Current.

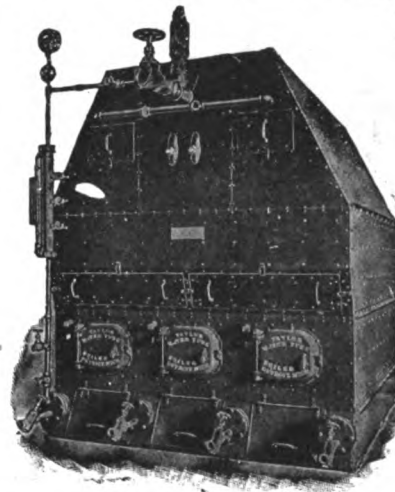
Westinghouse Electric & Mfg. Co.

Sales Offices in all Large Cities.

Pittsburgh, Pa.

For Canada: Canadian Westinghouse Co., Limited, Hamilton, Ontario.

Taylor Water Tube Boiler Co.



322 Franklin St.,
DETROIT, MICH.

Vertical Tubes,
sectional, large
steam space and
liberating area.

Fire box, com-
bustion chamber,
and course for the
furnace gases sim-
ilar to the Scotch
Marine.

Free circulation
type.

Send for full description.

The MARTIN-BARRISS CO.

IMPORTERS AND MANUFACTURERS OF

MAHOGANY, WHITE MAHOGANY
AND ALL NATIVE CABINET WOODS

High Grades of Kiln Dried Woods for Cabin Work and Inside Trim.

White Oak Timbers and Plank

Constantly on Hand and Sawed to Order on Short Notice,

654 SENECA ST. CLEVELAND, O.

CRANE VALVES

ESTABLISHED 1865

A COMPLETE SET OF CHARTS OF THE GREAT LAKES

ELEVEN IN ALL.
(Edges bound with Tape to Pre-
vent Tearing.)

Sent to any Address, Carriage Prepaid for \$5.45.

THE PENTON PUBLISHING CO.

CLEVELAND, OHIO.

CHARLES E. PECK.

WILLIAM A. PRIME.

CHAS. E. & W. F. PECK,

Insurance Brokers. Average Adjusters.

ESTABLISHED 1870.

NEW YORK, 58 William Street,

BOSTON, 153 Milk St.

BUFFALO, 906 The Fidelity Bldg.

CLEVELAND, 1107-8 Williamson Bldg.

CHICAGO, 1115-16 Royal Insurance Bldg.

REPRESENTED BY

C. T. BOWRING & CO., (Insurance) LTD.,

5 and 6 Billiter Ave., LONDON,
and at "LLOYD'S" LONDON.**HULLS and CARGOES.**

We place insurances in the most advantageous markets, employing, in the interest of our clients and with equal facility, all Foreign and Home companies, at the best procurable rates and terms.

We Represent Only the Assured.

The Only Standard American Classification of Shipping.



Has Authorized Agents in all the principal ports of the world to protect the interests of its patrons. Vessels built under its rules, or holding certificates of class in this Record of Shipping will, with their Cargoes, insure at lowest rates. Office, 66 Beaver Street, New York.

A. A. RAVEN, President.
W. H. H. MOORE, Treasurer.

W. R. T. JONES, Vice President.
W. IRVING COMBS, Secretary.

NEW HARBOR CHARTS OF THE LAKES.

Following is a list of harbor charts recently issued from the United States Lake Survey Office, all in colors: Duluth and Superior Harbors, Two Harbors, Ashland, Marquette, Milwaukee, Chicago, Muskegon, Charlevoix, Michigan City, Toledo Sandusky, Cleveland, Lorain, Fairport, Ashtabula, Conneaut, Erie, Dunkirk, Buffalo and Oswego.

For sale by

THE MARINE REVIEW,

Cleveland, Ohio.

**The Donnelly Salvage
and Wrecking Co., Ltd.,**

KINGSTON ONT.

DIVERS, STEAM PUMPS, TUGS, Etc.

SUPPLIED ON SHORTEST NOTICE.

JOHN DONNELLY, SR., Pres.
JOHN DONNELLY, JR., Vice-Pres.
H. B. FOLGER, Treas.
THOS. DONNELLY, Secy.

GREAT LAKES REGISTERFOR THE
CLASSIFICATION OF STEEL AND WOODEN VESSELS.

Estb. 1828

Estb. 1896

COMBINED AND ISSUED IN CONNECTION WITH

BUREAU VERITAS

INTERNATIONAL REGISTER OF SHIPPING.

THE RATINGS OF GREAT LAKES REGISTER GO BEFORE AND ARE ACCEPTED BY THE LEADING UNDERWRITERS OF AMERICA AND EUROPE. VESSELS BUILT UNDER THE SUPERVISION OF ITS SURVEYORS WILL RECEIVE SPECIAL RATING, AND WILL ALSO BE PUBLISHED IN BUREAU VERITAS INTERNATIONAL REGISTER OF SHIPPING.

PLANS AND SPECIFICATIONS FURNISHED.

GREAT LAKES REGISTER SURVEYORS ARE ESTABLISHED AT ALL THE PRINCIPAL PORTS ON THE GREAT LAKES.

F. D. HERRIMAN, SURVEYOR GENERAL,
320-322 Perry-Payne Building, CLEVELAND, O.

CRANE FITTINGS

ESTABLISHED 1865.

THE FRANKFORT Marine, Accident and Plate Glass INSURANCE CO.

of FRANKFORT-ON-THE-MAIN, GERMANY.

Employers Teams and Public Liability, Elevator Insurance, Workmen's Collective, Individual Accident.

For the security of Policyholders in the United States of America, a deposit has been made in the States of Massachusetts and New York of \$400,000.00 in United States Bonds.

UNITED STATES DEPARTMENT.

100 WILLIAM ST., NEW YORK, N. Y.

F. G. VOSS, Manager and Attorney.

I N S U R A N C E**GEO. L. McCURDY**

169 Jackson Boulevard

CHICAGO ILLINOIS

Direct Representative of Leading
American and Foreign Underwriters

HULLS AND CARGOES

AIDS TO NAVIGATION

are of vital importance to vessel interests.

SCHERZER ROLLING LIFT BRIDGES

aid navigation and meet with the approval of all vessel interests, because of the wide and unobstructed channel provided for navigation, enabling vessels to pass easily and rapidly through the draw.

The SCHERZER ROLLING LIFT BRIDGE Co.,

Main Offices: 1616 Monadnock Block,
CHICAGO, U. S. A.

WEEKLY ILLUSTRATED PRICE 6D.

"THE SHIPPING WORLD"

Written by Experts Illustrated by Artists

Annual Subscription, United Kingdom \$5.11
Other Countries, - - - - \$6.82

Contains the best and most informing
illustrated literature regarding

**Naval Architecture
Marine Engineering
Commercial & Shipping
Questions of the Day**

The Shipping World Ltd.,

Effingham House, Arundel Street, Strand,
LONDON, ENGLAND.

Subscriptions and advertisements for The Shipping
World accepted at the Marine Review offices.

LATEST PATENT ANCHOR

THE NATIONAL

APPROVED BY LLOYDS.

Manufactured by

L. M. BOWERS & CO.,
Binghamton, N. Y.

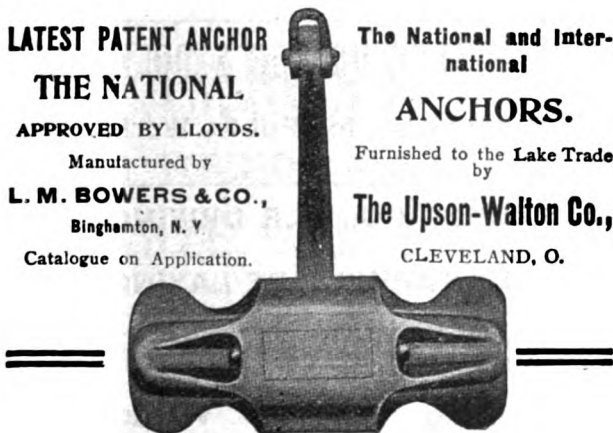
Catalogue on Application.

The National and Inter-
national

ANCHORS.

Furnished to the Lake Trade
by

The Upson-Walton Co.,
CLEVELAND, O.



• • Buffalo • • Wrought Steel Ranges Are the Best.

Steamboat and Barge Ranges with Rotary Grates.

No Cog Wheels to Warp or get out of order.

Don't take our word for it but ask some one using them.

Russell & Watson, General Steamboat Work
BUFFALO, N. Y. Send for Catalogue.

AGENTS—Topy Bros., Ashtabula Harbor, Ohio.
H. C. Weber & Co., Detroit, Mich.
John Black, So. Chicago, Ill.
Pritzlaff Bros., Milwaukee, Wis.

Holzapfel's Danboline and Lagoline Compositions

are made expressly for bunkers, holds, peaks and outsides
of steel vessels. For prices and particulars apply to

JAMES NACEY, 208 Western Reserve Building,
AGENT FOR THE GREAT LAKES DISTRICT. Cleveland, O.
Main office: Holzapfel's American Compositions Co., 18 B'way, New York.

All of the latest and largest LAKE STEAMSHIPS are com-
pletely equipped with

BLAKE

DUPLEX AND SIMPLEX SPECIAL MARINE PUMPS.
New Marine Catalog ready about July 1st.

Geo. F. Blake Mfg. Co.

114 Liberty St., :: :: :: NEW YORK CITY



For practical
work; for saving
time; for long
service and com-
plete satisfaction,
no other type-
writer quite
equals

The Smith Premier.

A little booklet explaining just why this is so will be sent on request.
Better ask about it today.

THE SMITH PREMIER TYPEWRITER CO.
158 Prospect Street - - - Cleveland, O.

IN A RECENT TEST

MADE BY UNCLE SAM,

where both Foreign and Domestic
Anchors were considered, the . . .

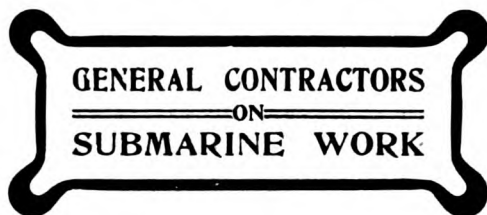
Baldt Stockless Anchor
was the only one approved

For Catalogue and particulars address



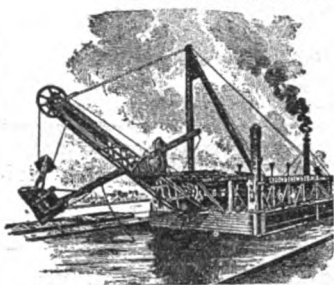
The Baldt Anchor Co., Chester, Pa.

BUFFALO DREDGING CO.



Office **D. S. MORGAN BLDG.**
BUFFALO, N. Y.

CHICAGO & GREAT LAKES DREDGE AND DOCK CO.



OWNS AND OPERATES THE PLANTS
OF THE FORMER COMPANIES:

Lydon & Drews Co.,
Hausler & Lutz Co.,
Green's Dredging Co.,
Chicago Star Con. & D.
Co.,
McMahon & Montgomery
Co.,
Chicago Dredging & Dock
Co.,
Griffith, McDermott &
Watt Dredging Co.

Contractors for
RIVER AND HARBOR IMPROVEMENTS.
Main Office: -1319-1322 Chamber of Commerce - **CHICAGO.**

Dunbar & Sullivan Dredging Co., of Buffalo, N. Y.

Will contract to remove **ROCK** or **EARTH** on the Great Lakes to 40 ft. depth.
To remove **ROCK** on Atlantic Coast to 40 ft. depth.

THAT'S ALL.

We **SOMETIMES** rent plant to responsible parties at **OUR** terms.

Dredges.

Brian Boru, Steel.
Tipperary Boy, Steel.
Erin Go Braugh.

Drill Boats.

Geo. A. Howells and
another, both Steel.

Tugs.

Shaughraun, Steel.
Phil Sheridan, Steel.
Spalpeen, Steel.
Paddy Miles, Steel.
Shaun Rhue, Steel.

Derrick.

Faugh a Ballaugh.

Scows.

Monroe Doctrine, 600 yds., Steel.
Protective Policy, 500 yds., Steel.
Reciprocity, 600 yds., Steel.
Cuba Libre, 250 yds., Steel.
Gold Standard, 250 yds., Steel.
No. 5, 600
No. 6, 600
No. 7, 600
No. 8, 600

4,600
McMyler derrick handling 10
tons at 75 ft. radius.

Small Scows.

HICKLER BROTHERS

MARINE RAILWAY

Capacity, 1,000 tons.

Draft, 7½ ft. forward, 13½ ft. aft.

Length on keel blocks, 180 ft.; over all, 190 ft.

Machine Shop, Foundry and Steam Forge.
Dredges, Drill Boats and Derrick Scows.

SAULT STE. MARIE, - MICH.

Lake Superior Contracting & Dredging Co.

*General Contractors for Public and
Private Work and River and
Harbor Improvements.*

Offices, Wolvin Building, **DULUTH, MINN.**

THE L. P. & J. A. SMITH COMPANY.

CONTRACTORS FOR PUBLIC WORKS

Dredging,	Dry Docks and	Bridges,
Harbor Work,	Pier Building,	Submarine
Pile Driving,	Railroads,	Foundations,
Breakwaters,	Canals,	Etc., Etc.

Offices: **Williamson Bldg., Cleveland, O.**

The Fitz-Simons & Connell Co.

CONTRACTORS
—FOR—
PUBLIC WORKS

DREDGING
DOCKS
PILE DRIVING
BREAKWATERS

TUNNELS
CANALS
BRIDGES
FOUNDATIONS

Offices: 1010-1014 Tacoma Building, Chicago.

C. H. STARKE DREDGE & DOCK CO.,

Contractors for Public Works.

**DREDGING, PILE DRIVING,
—AND—
SUBMARINE PIPE LAYING.**

Canal Street, West of First Avenue,

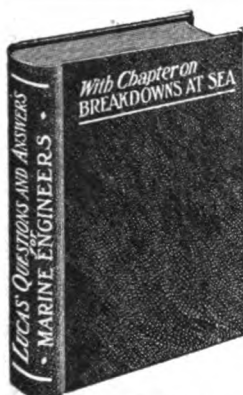
Milwaukee, - - Wisconsin.

N. SULLIVAN,

DREDGING OF ALL KINDS.

THE REMOVING OF DEEP
WATER EARTH AND ROCK
A SPECIALTY.

53 Woodward Ave. Terrace,
DETROIT, - - - MICH.



LUCAS' QUESTIONS AND ANSWERS FOR MARINE ENGINEERS

SECOND REVISED EDITION

In this second edition, in response to numerous requests, the publishers have added several subjects under the headings "Various Principles of Mathematics Useful to the Engineer and Machinist," the United States regulations relating to the examination of Engineers for licenses as Chief, First, Second and Third Engineers, prescribed by the Board of Supervising Inspectors, an introduction relating to the Qualifications and Opportunities for entering the Government and Mercantile Marine Engine Room Service.

More Than a Hundred Illustrations

PRICE \$2.00 POSTPAID
To any Address.

Money Refunded if Book is Not Entirely Satisfactory.

MARINE REVIEW, :: :: Cleveland, Ohio

Steamboat Fuel at Ashtabula.

Large Supplies of Best Quality.



Lighter Carrying Different
Grades at all Times.

Fuel Scow with elevators and discharging spouts. Storage of 800 tons.
Discharges 250 tons an hour into steamers while unloading cargo.

M. A. Hanna & Co., Miners and Shippers,
Main Office, Perry-Payne Bldg., Cleveland.

STEAMBOAT FUEL

at TOLEDO and HURON.

IRONVILLE DOCK & COAL CO.,

429 Spitzer Building, Toledo, Ohio.

Office, Main 1513. :: :: Bell Phones :: :: Dock, East 63.

Coal of Best Quality MASSILLON & PITTSBURG No. 8.

J. B. COWLE, Pres.

W. E. PERKINS, Sec'y and Treas
MAT. THOMAS, Gen'l Mgr.

The Union Machine & Boiler Company,

MACHINISTS, FOUNDERS AND BOILER MAKERS.

Jobbing solicited. Steel vessel repairs promptly attended to night or day.

108 TO 114 RIVER STREET. CLEVELAND, O.

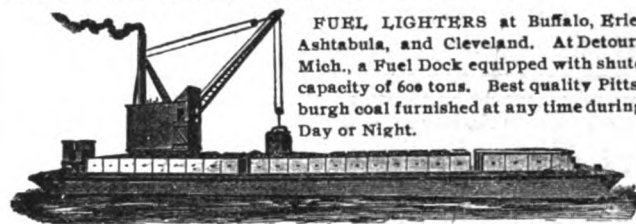
Phones: Bell Main 609. Cuy. A. 711. Night Call Cuy. M. 1848.

HOISTING ENGINES.

We build them in all sizes from new and improved designs. Every engine thoroughly tested before leaving our shop, and guaranteed to be satisfactory in every case. When in want of a hoist for marine work, dock work, mining, or any other purpose, kindly permit us to name you prices. We know we can please you.

MARINE IRON CO., - - - Bay City, Mich.

PICKANDS, MATHER & CO.,



FUEL LIGHTERS at Buffalo, Erie, Ashtabula, and Cleveland. At Detour, Mich., a Fuel Dock equipped with shute capacity of 600 tons. Best quality Pittsburgh coal furnished at any time during Day or Night.

Western Reserve Building, CLEVELAND, O.

HAWKINS' WORKS FOR ENGINEERS.

Most popular among young men in the engine departments of ships is "Engineers' Examinations with Questions and Answers." It sells at \$2 and the same is the cost, delivered, of the following works:

Hawkins' New Catechism of Electricity.

Hawkins' Maxims and Instructions for the Boiler Room.

Hawkins' Hand Book of Calculations for Engineers.

Hawkins' New Catechism of the Steam Engine.

THE MARINE REVIEW, CLEVELAND, O.

De Grauw, Aymar & Company.

ESTABLISHED 1827.

Cordage, Oakum, Vessel
and Railroad Supplies.

SOLE MANUFACTURERS IN THE UNITED STATES FOR
TYZACK'S STOCKLESS ANCHORS.
NEW YORK CITY.

TEXT BOOK OF NAVAL ARCHITECTURE.

BY J. J. WELCH.

\$1.50.

MARINE REVIEW, - - - CLEVELAND.

VESSEL AND INSURANCE AGENTS.

T. R. McCARTHY,
Steamship and Freight Broker,
Chartering, Forwarding and General Commission Agent, and Broker for the Sale, Purchase and Construction of Steamers and Sailing Vessels.
Marine and Fire Insurance Effected.
 Cable Address, "Macarthy, Montreal."
 (Watkins', Scott's Liebers and A. B. C. Codes Used.)
Shipping Agent to The Asbestos & Asbestic Co., Ltd., of Danville, Que., and The Belgo Pulp & Paper Co., Shawinigan Falls, Que.
 404 Board of Trade Bldg., MONTREAL, CAN.
Correspondence Invited and Agencies Solicited.

S. S. LESTER,
Steamship Agent and Freight Broker.
 Manager Steamer
ST. LAWRENCE,
 83 Dalhousie St. QUEBEC, QUE.

Insurance.
PRINDIVILLE & COMPANY,
Average Adjusters.
Insurance Brokers.
 12 Sherman Street,
 CHICAGO.
Representing:
 Johnson & Higgins, New York.
Represented by:
 Willis Faber & Co., Ltd., London.
 Jno. D. Tyson & Co., Liverpool.

P. H. FLEMING & CO.
Insurance and Vessel Agents.
Marine, Fire, Ocean, Liability.
 Telephone, Harrison 1359.
 No. 2 Sherman St., CHICAGO, ILL.

C. W. Elphicke. J. J. Rardon. M. C. Reuter.
C. W. ELPHICKE & CO.
Vessel and Insurance Agents.
 No. 6 Sherman St., CHICAGO, ILL.
 Telephone, Harrison 1194.

D. Sullivan. F. J. Sullivan.
D. SULLIVAN & CO.
Vessel Agents.
Marine Insurance.
 2-4 Sherman St., CHICAGO, ILL.
 Office Tel., Harrison 2847. Res. Ashland 2488.

W. A. Hawgood. Arthur H. Hawgood.
W. A. HAWGOOD & CO.
Vessel and Insurance Agents.
 220-21 Perry-Payne Bldg., Cleveland, O.
 Telephones. { Office, Main 2895.
 { Res. W. A. Hawgood, Doan 84-J.
 { Res. A. H. Hawgood, Doan 841-J.

J. Mitchell. J. F. Wedow. A. Mitchell.
MITCHELL & CO.
Vessel and Insurance Agents.
 508-10 Perry-Payne Bldg., Cleveland, O.
 Office Tel. M. 787. Res. John Mitchell, Doan 841.
 John F. Wedow, Doan 141-J.
 Alfred Mitchell, Doan 218.

VESSEL AND INSURANCE AGENTS.

C. L. Hutchinson. W. H. McGean.
HUTCHINSON & CO.
Vessel and Insurance Agents.
 { Office, Main 2453.
 { Res. C. L. Hutchinson, Ridge 845 L.
 { Res. W. H. McGean, East 1421-J.
 313-15 Perry-Payne Bldg., Cleveland, O.

W. C. RICHARDSON,
Vessel Owner and Broker and Marine Insurance Agent.
 420-421 Perry Payne Building,
 CLEVELAND, O.
 Office Tel., 388. Residence Tel., 2988.

C. P. GILCHRIST & CO.
Vessel and Insurance Agents.
Sale and Exchange of Vessels a Specialty.
Lumber and Coal Chartering.
 Full Telephone Service, Office and Residence.
 (Local and Long Distance.)
 411 Perry-Payne Bldg., Cleveland, O.

John B. Hall. Harry B. Root.
HALL & ROOT,
Vessel Agents.
 21-22 Exchange Bldg., 202 Main St.,
 Telephone, Seneca 892. BUFFALO, N. Y.

JOHN J. BOLAND,
Vessel and Insurance Agent.
 25-26 Exchange Bldg., 202 Main St.,
 Telephone, Seneca 115. BUFFALO, N. Y.

PARKER BROS. CO., LTD.,
Vessel, Marine Insurance and Wrecking Agents. Marine Surveyors.
 Office Tel. Main 5314. Night: Main 280.
 Night: Grand 1723 J.
 15 Atwater St. West, DETROIT, MICH.

D. T. HELM & CO.
Vessel and Insurance Agents.
 Telephones—Office 283.
 Res. 831-8.
 DULUTH, - - - MINN.

SAMUEL HOLMES,
Steamship Offices,
For Selling, Chartering and Building all Classes Steam Vessels
Steam Vessel Circulars
Weekly Freight Circulars
 Morris Bldg, 66-8 Broad St., New York.

PROCTORS IN ADMIRALTY.

C. E. KREMER,
Counselor at Law and Proctor in Admiralty.
 Suite 821-822 New York Life Bldg.,
 CHICAGO, ILL.

HOYT, DUSTIN & KELLEY,
Lawyers and Proctors in Admiralty.
 Offices, 702 Western Reserve Building,
 CLEVELAND, O.

WHITE, JOHNSON, McCASLIN & CANNON,
Attorneys-at-Law and Proctors in Admiralty.
 Williamson Bldg., CLEVELAND, O.

GOULDER, HOLDING & MASTEN,
Law Offices.
 H. D. Goulder. S. H. Holding. F. S. Masten.
 Perry Payne Building,
 CLEVELAND, O.

ALBERT J. GILCHRIST,
Proctor in Admiralty.
 604 Perry Payne Building,
 CLEVELAND, O.

HAND BOOK
OF
ADMIRALTY LAW,
 by
ROBT. M. HUGHES,
 Price, \$3.75
 THE PENTON PUB. CO.,
 Cleveland, O.

MARINE INSURANCE,
 by
WILLIAM GOW.
 Price, \$1.50
 THE PENTON PUB. CO.,
 Cleveland, O.

PROCTORS IN ADMIRALTY.

Geo. S. Potter. Meredith Potter.
POTTER & POTTER,
Lawyers and Proctors in Admiralty.
 35-36 Dun Building, 110 Pearl Street,
 BUFFALO, N. Y.

RAY G. MacDONALD,
Attorney-at-Law and
Proctor in Admiralty.
 630 First National Bank Building,
 Telephone, Central 3507
 Automatic 8085 CHICAGO, ILL.

**SHAW, WARREN, CADY &
 OAKES,**
Attorneys-at-Law.
 904 to 907 Union Trust Building,
 Telephone, 625. DETROIT, MICH.

NAVAL ARCHITECTURE,
 by
THOS. H. WATSON.
 A manual on laying off iron and steel ves-
 sels. Valuable for naval architects as well as
 beginners in ship yards.
 Price, \$5.00
 Order from
 THE PENTON PUB. CO.,
 Cleveland, O.

**NAVAL ARCHITECTS' AND
 ENGINEERS' DATA BOOK,**
 By T. H. WATSON.
 Price, \$1.50
 THE PENTON PUB. CO.,
 Cleveland, O.

PROFESSIONAL.

W. J. WOOD,
Naval Architect, Consulting Engineer.

Prepares designs or working drawings and
 specifications for all classes of vessels and
 superintends construction and repairs. Sur-
 veys damaged property and estimates cost of
 repairs. Arbitrator and court expert.

FIRE BOATS A SPECIALTY.

Complete Plans furnished for Steel, Compo-
 site or Wooden Vessels.

709 Rialto Building, CHICAGO.
 Tel. Harrison 1020.

John G. Kreer. Ralph M. Parsons.

KREER & PARSONS,

*Naval Architects,
 Ship Engineers and Builders.*

Steel Tugs, Lighters, Barges, Shallow-draft
 Steamboats for river service. Designers for
 all classes of Boats and Marine Machinery.

ENGINE TESTS.

Works and Office,
 2 to 24 Lawrence St., CHICAGO.
 Telephone North 1688.

**HENRY RICE and
 H. O. LOVEJOY,**

*Naval Architects.
 Consulting Engineers.*

Surveyors of Wood and Steel Ships, Engines
 and Boilers. Estimates of cost given. Super-
 intendence of building and repairing. Plans
 and specifications furnished for all classes
 of ships.

Lines and models furnished.

Room 18,
 202 Main Street., BUFFALO, N. Y.

JOSEPH KIDD,

*Marine Architect and Surveyor.
 Consulting Ship Builder and Engineer*

Over thirty years' experience. Specifica-
 tions, designs and estimates. Superintendence
 of construction and repairs. Damage and
 other surveys carefully attended to. Nego-
 tiations for the building, charter or sale of all
 kinds of vessels and machinery.

610 Board of Trade,

DULUTH, MINN.

AMBROSE V. POWELL,
 Member American Society Civil Engineers
Civil Engineer.
 Designs and Constructs Dry Docks, Harbor
 Works, Docks, and Plant for Handling Coal
 and Ore, Foundations
 Office, 1008 Chamber of Commerce,
 CHICAGO, ILL.

PROFESSIONAL.

H. Matteson, Jr. Geo. B. Drake.
MATTESON & DRAKE,
*Naval Architects,
 Consulting Engineers,
 Vessel Brokers and Surveyors.*

Designing and Superintendence of building
 and repairing of steel and wooden vessels.

Contractors for the construction of all classes
 of steel and wooden vessels.

Bulk oil vessels a specialty.

706-707 Bourse, PHILADELPHIA.
 Manufacturers' agents for marine specialties
 and supplies.

James Nacey. Alexander Hynd.

NACEY & HYND,

*Marine Architects.
 Mechanical Draughtsmen.
 Consulting Engineers.*

Specifications and designs for all descrip-
 tions of marine vessels, engines and boilers.
 Supervision of construction and repairs. Da-
 mage and other surveys carefully attended to.

Agents for Marine Specialties.

208-9 Western Reserve Building,
 CLEVELAND, O.
 Phone, Main 3339 J.

**PITTSBURGH TESTING
 LABORATORY, Ltd.,**

*Inspecting and Metallurgical
 Engineers and Chemists.*

Inspectors of shipbuilding materials and
 machinery. Inspectors located at all mills.
 Physical and chemical laboratories. Tests
 of all kinds.

1750 Monadnock, CHICAGO.
 235 Water Street, PITTSBURG.

906-7 Crozier Building, Philadelphia,
 New York City, 60 New Street,
 Richmond, Va., 1107 1/2 Main Street.

ROBERT W. HUNT & CO.,

*Bureau of Inspection.
 Tests and Consultation.*

1121 The Rookery, CHICAGO.

Monong. Bank Bldg., PITTSBURG.

66 Broadway, NEW YORK.

Inspectors of shipbuilding material and
 machinery. Inspectors of all materials. Duty
 tests of engines and boilers. Physical and
 chemical laboratories.

Members Maritime Association Port of N. Y.
**SADLER, PERKINS
 & FIELD,**
*Naval Architects and Engineers.
 Chartering and Brokerage.*
 Maritime Bldg., New York.
 NEW YORK. DETROIT.

Buyers' Directory of the Marine Trade

For a more complete classification than that represented by advertisers in the Marine Review, see the BLUE BOOK OF AMERICAN SHIPPING, marine and naval directory of the United States, published by the Marine Review, 39-41 Wade Bldg., Cleveland.

See accompanying index of Advertisers for full addresses of concerns in this directory.

AIR COMPRESSORS, AIR HOISTS, ETC.

Dake Engine Co.....Grand Haven, Mich.
Great Lakes Engineering Works.....Detroit.
Mietz, Aug.New York.

AIR PORTS, DEAD LIGHTS, ETC.

Marine Mfg. & Supply Co.....New York.

AIR PUMPS AND APPLIANCES.

Fore River Ship & Engine Co..Quincy, Mass.
Great Lakes Engineering Works.....Detroit.

ANCHORS.

Baldt Anchor Co.....Chester, Pa.
Bowers, L. M. & Co.....Binghamton, N. Y.
DeGrauw, Aymar & Co.....New York.
Seaboard Steel Casting Co.....Chester, Pa.

ANTI-FOULING AND ANTI-CORROSIVE COMPOSITION FOR STEEL VESSELS.

Holzapfel's American Composition Co..New York.

ANTI-FRICTION METALS.

Cramp, Wm. & Sons.....Philadelphia.
Phosphor Bronze Smelting Co., Ltd.....
.....Philadelphia.
Victor Metals Co.....Braintree, Mass.

ARTIFICIAL DRAFT FOR BOILERS.

American Ship Building Co.....Cleveland.
Detroit Ship Building Co.....Detroit.
Great Lakes Engineering Works.....Detroit.
Sturtevant, B. F., Co.....Hyde Park, Mass.

ASH EJECTORS.

Great Lakes Engineering Works.....Detroit.

ATTORNEYS AND PROCTORS IN ADMIRALTY.

Gilchrist, Albert J.....Cleveland.
Goulder, Holding & Masten.....Cleveland.
Hoyt, Dustin & Kelley.....Cleveland.
Kremer, C. E.....Chicago.
MacDonald, Ray G.....Chicago.
Potter & Potter.....Buffalo.
Shaw, Warren, Cady & Oakes.....Detroit.
White, Johnson, McCaslin & Cannon Cleveland.

BAROMETERS, MARINE GLASSES, ETC.

Ritchie, E. S. & Sons.....Brookline, Mass.

BELTING, RUBBER.

New York Belting & Packing Co.....New York.

BLOCKS, SHEAVES, ETC.

Boston & Lockport Block Co.....Boston, Mass.
Cleveland Block Co.....Cleveland.

BLOWERS.

Sturtevant, B. F. Co.....Hyde Park, Mass.

BOAT BUILDERS.

Dren, Thos. & Son.....Wilmington, Del.
Kahnweiler's Sons, David.....New York.
Lane & DeGroot.....Long Island City, N. Y.
Marine Construction & D. D. Co.....
.....Mariner's Harbor, S. I., N. Y.
Truscott Boat Mfg. Co.....St. Joseph, Mich.
Willard, Chas. P. & Co.....Chicago.

BOILER COMPOUNDS.

Dearborn Drug & Chemical Works.....Chicago.

BOILER MANUFACTURERS.

Almy Water Tube Boiler Co.Providence, R. I.
American Ship Building Co.....Cleveland.
Atlantic Works.....East Boston, Mass.
Babcock & Wilcox Co.....New York.
Bertram Engine Works Co., Ltd.....
.....Toronto, Can.
Chicago Ship Building Co.....Chicago.
Cramp, Wm. & Sons.....Philadelphia.
Delaunay, Belleville & Co..St. Denis, France.
Detroit Ship Building Co.....Detroit.
Fletcher, W. A. & Co.....Hoboken, N. J.
Fore River Shipbuilding Co.....Quincy, Mass.
Forest City Boiler Co.....Cleveland.
Georgian Bay Engineering Works.....
.....Midland, Ont.

BOILER MANUFACTURERS—Continued.

Great Lakes Engineering Works.....Detroit.
Yenks Ship Building Co.....Port Huron, Mich.
Kingsford Foundry & Machine Works.....
.....Oswego, N. Y.
Milwaukee Dry Dock Co.....Milwaukee.
Mosher Water Tube Boiler Co.....New York.
Newport News Ship Building Co.....
.....Newport News, Va.
Northwestern Steam Boiler & Mfg. Co.....
.....Duluth, Minn.
Roberts Safety Water Tube Boiler Co.....
.....New York.
Stirling, The Co.....Chicago.
Superior Ship Building Co.....Superior, Wis.
Taylor Water Tube Boiler Co.....Detroit.
Union Machine & Boiler Co.....Cleveland.
United States Ship Building Co.....New York.
Willard, Chas. P. & Co.....Chicago.

BOILER RIVETS.

Bourne-Fuller Co.....Cleveland.

BOILER STAYBOLTS, IRON OR STEEL, HOLLOW OR SOLID.

Falls Hollow Staybolt Co..Cuyahoga Falls, O.

BRASS AND BRONZE CASTINGS.

Cramp, Wm. & Sons.....Philadelphia.
Fore River Ship & Engine Co..Quincy, Mass.
Great Lakes Engineering Works.....Detroit.
Lunkenheimer Co.....Cincinnati.
Macbeth Iron Co.....Cleveland.
Phosphor Bronze Smelting Co.....Philadelphia.
Victor Metals Co.....Braintree, Mass.

BRIDGES, BUILDERS OF.

Scherzer Rolling Lift Bridge Co....Chicago.

BUCKETS, ORE AND COAL.

Brown Hoisting & Conveying Machine Co.....
.....Cleveland.
Forest City Boiler Co.....Cleveland.
Macbeth Iron Co.....Cleveland.

CABIN AND CABINET FINISHING WOODS.

Martin-Barriss Co.....Cleveland.

CAPSTANS.

American Ship Windlass Co..Providence, R. I.
Hyde Windlass Co.....Bath, Me.
Marine Mfg. & Supply Co.....New York.

CEMENT, IRON FOR REPAIRING LEAKS.

Smooth-On Mfg. Co.....Jersey City, N. J.

CHAINS.

Lebanon Chain Works.....Lebanon, Pa.

CHAIN HOISTS.

Boston & Lockport Block Co.....Boston, Mass.
Dake Engine Co.....Grand Haven, Mich.

CHARTS.

Penton Publishing Co.....Cleveland.
Potter, J. D.....London.

CLOCKS (Marine and Ship's Bell) AND CHRONOMETERS.

Ashton Valve Co.....Boston.
Ritchie, E. S. & Sons.....Brookline, Mass.
Standard Gauge Mfg. Co.....Syracuse, N. Y.

COAL PRODUCERS AND SHIPPERS.

Hanna, M. A. & Co.....Cleveland.
Pickands, Mather & Co.....Cleveland.
Pittsburg Coal Co.....Cleveland.

COAL AND ORE HANDLING MACHINERY.

Brown Hoisting Machinery Co. (Inc.) ..
.....Cleveland.
Macbeth Iron Co.....Cleveland.

COMPASSES.

Ritchie, E. S. & Sons.....Brookline, Mass.

COMPOSITIONS FOR SHIP'S BOTTOMS.

Holzapfel's American Compositions Co..New York.

CONCRETE MIXERS.

Contractors Supply & Equipment Co..Chicago.

CONDENSORS.

Great Lakes Engineering Works.....Detroit.
Thropp & Sons Co., John E....Trenton, N. J.

CONTRACTORS SUPPLIES.

Contractors Supply & Equipment Co., Chicago.

CONTRACTORS FOR PUBLIC WORKS.

Buffalo Dredging Co.....Buffalo.
Chicago & Gt. Lakes Dredge & Dock Co.....
.....Chicago.
Dunbar & Sullivan Dredging Co.....Buffalo.
Fitz-Simons & Connell Co.....Chicago.
Hickler Bros.Sault Ste. Marie, Mich.
Lake Superior Contracting & Dredging Co.....
.....Duluth, Minn.
Smith Co., L. P. & J. A.....Cleveland.
Starke Dredge & Dock Co., C. H..Milwaukee.
Sullivan, M.Detroit.

CORDAGE.

Baker & Co., H. H.....Buffalo.
DeGrauw, Aymar & Co.....New York.
Upson-Walton Co.....Cleveland.

CORK JACKETS AND RINGS.

Armstrong Cork Co.....Pittsburg, Pa.
Kahnweiler's Sons, D.....New York.

COURSE FINDER.

Field's Patent Course Finder.....Cleveland.

CHAIN CONVEYORS, HOISTS.

Brown Hoisting Machinery Co. (Inc.)....
.....Cleveland.
General Electric Co.....Schenectady, N. Y.
Westinghouse Electric & Mfg. Co.....
.....Pittsburg, Pa.

CRANES, TRAVELING.

Brown Hoisting Machinery Co.....Cleveland.
Pawling & Harnischfeger.....Milwaukee.

DIVING APPARATUS.

Morse, A. J. & Son.....Boston.
Schrader's Son, A.....New York.

DREDGING CONTRACTORS.

Buffalo Dredging Co.....Buffalo.
Chicago & Gt. Lakes Dredge & Dock Co.....
.....Chicago.
Dunbar & Sullivan Dredging Co.....Buffalo.
Fitz-Simons & Connell Co.....Chicago.
Hickler Bros.Sault Ste. Marie, Mich.
Lake Superior Contracting & Dredging Co.....
.....Duluth, Minn.
Smith Co., L. P. & J. A.....Cleveland.
Starke Dredge & Dock Co., C. H..Milwaukee.
Sullivan, M.Detroit.

DRYING APPARATUS.

Sturtevant, B. F., Co.....Hyde Park, Mass.

DRY DOCKS.

American Ship Building Co.....Cleveland.
Atlantic Works.....East Boston, Mass.
Buffalo Dry Dock Co.....Buffalo.
Chicago Ship Building Co.....Chicago.
Craig Ship Building Co.....Toledo, O.
Cramp, Wm. & Sons.....Philadelphia.
Detroit Ship Building Co.....Detroit.
Great Lakes Engineering Works.....Detroit.
Lockwood Mfg. Co.....East Boston, Mass.
Manitowoc Dry Dock Co.....Manitowoc, Wis.
Milwaukee Dry Dock Co.....Milwaukee.
Newport News Ship Building Co.....
.....Newport News, Va.
Shipowners Dry Dock Co.....Chicago.
Superior Ship Building Co.....Superior, Wis.
United States Ship Building Co.....New York.

Buyers' Directory of the Marine Trade.—Continued.

ELECTRIC HOISTS AND CRANES.

Fisher Electrical Works.....Detroit.
General Electric Co.....Schenectady, N. Y.
Pawling & Harnischfeger.....Milwaukee.
Westinghouse Electric & Mfg. Co.....Pittsburg, Pa.

ELECTRIC LIGHT AND POWER PLANTS.

Fisher Electrical Works.....Detroit.
General Electric Co.....Schenectady, N. Y.
Mietz, Aug.....New York.
Sturtevant, B. F. Co.....Hyde Park, Mass.
Thropp & Sons, John E.....Trenton, N. J.
Westinghouse Electric & Mfg. Co.....Pittsburg, Pa.

ENGINE BUILDERS, MARINE.

American Ship Building Co.....Cleveland.
Atlantic Works.....East Boston, Mass.
Bertram Engine Works Co., Ltd.....Toronto, Can.
Chicago Ship Building Co.....Chicago.
Chase Machine Co.....Cleveland.
Cramp, Wm. & Sons.....Philadelphia.
Craig Ship Building Co.....Toledo, O.
Dake Engine Co.....Grand Haven, Mich.
Detroit Ship Building Co.....Detroit.
Fletcher, W. & A. Co.....Hoboken, N. J.
Fore River Shipbuilding Co.....Quincy, Mass.
Great Lakes Engineering Works Detroit, Mich.
Hall Bros.....Philadelphia.
Jenks Ship Building Co.....Port Huron, Mich.
Lockwood Mfg. Co.....East Boston, Mass.
Macbeth Iron Co.....Cleveland.
Mietz, Aug.....New York.
Milwaukee Dry Dock Co.....Milwaukee.
Mosher, Chas. D.....New York.
Moulton Steering Engine Co.....New York.
Newport News Ship Building Co.....Newport News, Va.
Northwestern Steam Boiler & Mfg. Co.....Duluth, Minn.
Roach's Ship Yard.....Chester, Pa.
Sheriffs Mfg. Co.....Milwaukee.
Superior Ship Building Co.....Superior, Wis.
Thropp, J. E. & Sons Co.....Trenton, N. J.
Trout, H. G.....Buffalo.
United States Ship Building Co.....New York.
Willard, Chas. P. & Co.....Chicago.

ENGINE ROOM TELEGRAPH, CALL BELLS, ETC.

Cory, Chas. & Son.....New York.
Marine Mfg. Supply Co.....New York.

ENGINE TESTING.

Kreer & Parsons.....Chicago.

ENGINEERING SPECIALTIES AND SUPPLIES.

Crane Co.....Chicago.
Kieley & Mueller.....New York.
Lunkenheimer Co.....Cincinnati.
New York Belting & Packing Co.....New York.
Northwestern Steam Boiler & Mfg. Co.....Duluth, Minn.

ENGINEERS, MARINE, MECHANICAL, CONSULTING.

Hynd, Alexander.....Cleveland.
Hunt, Robt. W. & Co.....Chicago.
Kidd, Joseph.....Duluth, Minn.
Kreer & Parsons.....Chicago.
Lovejoy, H. O.....Buffalo.
Matteson & Drake.....Philadelphia.
Mosher, Chas. D.....New York.
Nacey, James.....Cleveland.
Pittsburg Testing Laboratory, Ltd.....Pittsburg.
Rice, Henry.....Buffalo.
Roelker, H. B.....New York.
Sadler, Perkins & Field.....New York.
Steel, Adam.....Cleveland.
Wood, W. J.....Chicago.

FANS FOR VENTILATION, EXHAUST, ETC.

Sturtevant, B. F. Co.....Hyde Park, Mass.

FEED WATER PURIFIERS AND HEATERS.

Reilly Repair and Supply Co., Jas.....New York.
Ross Valve Co.....Troy, N. Y.

FIXTURES FOR LAMPS, OIL OR ELECTRIC.

General Electric Co.....Schenectady, N. Y.
Westinghouse Electric & Mfg. Co.....Pittsburg, Pa.

FORGES.

Sturtevant, B. F. Co.....Boston.

FORGINGS FOR CRANK, PROPELLER OR THRUST SHAFTS, ETC.

Cleveland City Forge & Iron Co.....Cleveland.
Fore River Shipbuilding Co.....Quincy, Mass.
Macbeth Iron Co.....Cleveland.

FLUE WELDING.

Fix's, S. Sons.....Cleveland.

FUEL ECONOMIZERS.

Sturtevant Co., B. F.....Hyde Park, Mass.

FUELING COMPANIES AND COAL DEALERS.

Hanna, M. A. & Co.....Cleveland.
Ironville, Dock & Coal Co.....Toledo, O.
Parker Bros. Co., Ltd.....Detroit.
Picklands, Mather & Co.....Cleveland.
Pittsburg Coal Co.....Cleveland.
Smith, Stanley B., & Co.....Detroit.
Smith Coal & Dock Co., Stanley B. Toledo, O.

FURNACES FOR BOILERS.

Continental Iron Works.....New York.

GASKETS, RUBBER.

New York Belting & Packing Co.....New York.

GAS BUOYS.

Safety Car Heating & Lighting Co.....New York.

GAS AND GASOLINE ENGINES.

Chase Machine Co.....Cleveland.
Georgian Bay Engineering Works.....Midland, Ont.
Reliance Mfg. Co.....Providence R. I.

GAUGES, STEAM AND VACUUM.

American Steam Gauge & Valve Mfg. Co.....Boston.
Ashton Valve Co.....Boston.
Lunkenheimer Co.....Cincinnati.
Standard Gauge Mfg. Co.....Syracuse, N. Y.

GAUGES, WATER.

Bonner & Co., Wm. T.....Boston.
Lunkenheimer Co.....Cincinnati, O.
Standard Gauge Mfg. Co.....Syracuse, N. Y.

GRAPHITE.

Dixon Crucible Co., Joseph.....Jersey City, N. J.

HAMMERS, STEAM.

Chase Machine Co.....Cleveland.

HEATING APPARATUS.

Sturtevant, B. F. Co.....Hyde Park, Mass.

HOISTS FOR CARGO, ETC.

American Ship Building Co.....Cleveland.
Brown Hoisting Machinery Co. (Inc.).....Cleveland.
Chase Machine Co.....Cleveland.
General Electric Co.....New York.
Georgian Bay Engineering Works.....Midland, Ont.
Hyde Windlass Co.....Bath, Me.
Marine Iron Co.....Bay City.
Mietz, Aug.....New York.
Pawling & Harnischfeger.....Milwaukee.
Westinghouse Electric & Mfg. Co.....Pittsburg, Pa.

HOLLOW STAYBOLT IRON.

Falls Hollow Staybolt Co.....Cuyahoga Falls, O.

HOSE, RUBBER.

New York Belting & Packing Co.....New York.

HYDRAULIC DREDGES.

Great Lakes Engineering Works.....Detroit.

HYDRAULIC TOOLS.

Watson-Stillman Co., The.....New York.

ICE MACHINERY.

Great Lakes Engineering Works.....Detroit.
Roelker, H. B.....New York.

INDICATORS FOR STEAM ENGINES.

American Steam Gauge Co.....Boston.
Ashton Valve Co.....Boston.

INJECTORS.

American Injector Co.....Detroit.
Crane Co.....Chicago.
Jenkins Bros.....New York.
Lunkenheimer Co.....Cincinnati.
Penberthy Injector Co.....Detroit, Mich.

INSURANCE, MARINE.

Elphicke, C. W. & Co.....Chicago.
Fleming & Co., P. H.....Chicago.
Frankfort Marine, A. & P. G. Ins. Co.....New York.

INSURANCE, MARINE—Continued.

Gilchrist & Co., C. P.....Cleveland.
Hawgood & Co., W. A.....Cleveland.
Helm & Co., D. T.....Duluth.
Hutchinson & Co.....Cleveland.
McCarthy, T. R.....Montreal.
McCurdy, Geo. L.....Chicago.
Mitchell & Co.....Cleveland.
Parker Bros. Co., Ltd.....Detroit.
Peck, Chas. E. & W. F. New York & Chicago.
Prindiville & Co.....Chicago.
Richardson, W. C.....Cleveland.
Sullivan, D. & Co.....Chicago.
Voss, F. D.....New York.

IRON ORE AND PIG IRON.

Bourne-Fuller Co.....Cleveland, O.
Hanna, M. A. & Co.....Cleveland.
Pickands, Mather & Co.....Cleveland.

LAUNCHES—STEAM, NAPHTHA, ELECTRIC.

Georgian Bay Engineering Works.....Midland, Ont.
Marine Construction & D. D. Co.....Mariner's Harbor, S. I., N. Y.
Truscott Boat Mfg. Co.....St. Joseph, Mich.
Willard, Chas. P.....Chicago.

LIFE PRESERVERS, LIFE BOATS, BUOYS.

Armstrong, Cork Co.....Pittsburg.
Drein, Thos. & Son.....Wilmington, Del.
Kahnweiler's Sons, D.....New York.

LIGHTS, SIDE AND SIGNAL.

Russell & Watson.....Buffalo.

LOGS.

Walker & Sons, Thomas.....Birmingham, Eng.
Also Ship Chandlers.

LUBRICATING GRAPHITE.

Dixon Crucible Co., Joseph.....Jersey City, N. J.

LUBRICATORS.

Crane Co.....Chicago.
Lunkenheimer Co.....Cincinnati.

LUMBER.

Martin-Barriss Co.....Cleveland.

MACHINISTS.

Chase Machine Co.....Cleveland.
Hickler Bros.....Sault Ste. Marie, Mich.
Lockwood Mfg. Co.....East Boston, Mass.
Macbeth Iron Co.....Cleveland.
Union Machine & Boiler Co.....Cleveland.

MACHINE TOOLS (WOOD WORKING).

Atlantic Works, Inc.....Philadelphia.

MARINE RAILWAYS.

Hickler Bros.....Sault Ste. Marie, Mich.

MARINE GLUE.

Ferdinand & Co., L. W.....Boston, Mass.

MARINE RAILWAYS, BUILDERS OF.

Crandall & Son, H. I.....East Boston, Mass.

MATTRESSES, CUSHIONS, BEDDING.

Fogg, M. W.....New York.

MECHANICAL DRAFT FOR BOILERS.

American Ship Building Co.....Cleveland.
Detroit Ship Building Co.....Detroit.
Great Lakes Engineering Works.....Detroit.
Sturtevant, B. F. Co.....Hyde Park, Mass.

MELTING POT AND PAYING LADLE.

(For Paying Seams of Decks with Marine Glue.)
Ferdinand & Co., L. W.....Boston.

METALLIC PACKING.

Katzenstein, L. & Co.....New York.

METAL POLISH.

Bertram's Oil Polish Co.....Boston.

MOTORS, GENERATORS—ELECTRIC.

Fisher Electrical Works.....Detroit.
General Electric Co.....Schenectady, N. Y.
Sturtevant, B. F. Co.....Hyde Park, Mass.
Westinghouse Electric & Mfg. Co.....Pittsburg, Pa.

Buyers' Directory of the Marine Trade.—Continued.

NAUTICAL INSTRUMENTS.

Ritchie, E. S., & Sons.....Brookline, Mass.

NAUTICAL SCHOOLS.

Chicago Nautical School.....Chicago.

NAVAL ARCHITECTS.

Hynd, Alexander.....Cleveland.
 Kidd, Joseph.....Duluth, Minn.
 Kreer & Parsons.....Chicago.
 Lovejoy, H. O.....Buffalo.
 Matteson & Drake.....Philadelphia.
 Mosher, Chas. D.....New York.
 Nacey, James.....Cleveland.
 Rice, Henry.....Buffalo.
 Sadler, Perkins & Field.....New York.
 Steel, Adam.....Cleveland.
 Wood, W. J.....Chicago.

OAKUM.

DeGrauw, Aymar & Co.....New York.
 Stratford, Oakum Co.....Jersey City, N. J.

OIL ENGINES.

Mietz, Aug.New York.

OILS AND LUBRICANTS.

Dixon Crucible Co., Joseph.....Jersey City, N. J.
 Standard Oil Co.....Cleveland.

PACKING.

Crane Co.....Chicago.
 Jenkins Bros.....New York.
 Katzenstein, L. & Co.....New York.
 New York Belting & Packing Co.....New York.

PACKING TOOL.

Matteson & Drake.....Philadelphia.

PAINTS.

Baker, Howard H. & Co.....Buffalo.
 Detroit Varnish Co.....Detroit.
 Detroit White Lead Works.....Detroit.
 New Jersey Zinc Co.....New York.
 Upson-Walton Co.....Cleveland.

PATTERN SHOP MACHINERY.

Atlantic Works, Inc.....Philadelphia.

PILE DRIVING AND SUBMARINE WORK.

Buffalo Dredging Co.....Buffalo.
 Chicago & Gt. Lakes Dredge & Dock Co.....Chicago.
 Dunbar & Sullivan Dredging Co.....Buffalo.
 Fitz-Simons & Connell Co.....Chicago.
 Hickler Bros.....Sault Ste. Marie, Mich.
 Lake Superior Contracting & Dredging Co.....Duluth, Minn.
 Parker Bros. Co., Ltd.....Detroit.
 Smith Co., L. P. & J. A.....Cleveland.
 Starke Dredge & Dock Co., C. H.....Milwaukee.
 Sullivan, M.....Detroit.

PIPE, WROUGHT IRON.

Bourne-Fuller Co.....Cleveland, O.
 Crane Co.....Chicago.
 Macbeth Iron Co.....Cleveland.

PLANING MILL MACHINERY.

Atlantic Works, Inc.....Philadelphia.

PLATES—SHIP, STRUCTURAL, ETC.

Bourne-Fuller Co.....Cleveland, O.
 Otis Steel Co.....Cleveland.

PNEUMATIC TOOLS.

Allen, John F.....New York.

POLISH FOR METALS.

Bertram's Oil Polish Co.....Boston.

PRESSURE REGULATORS.

Kieley & Mueller.....New York.
 Ross Valve Co.....Troy, N. Y.

PROPELLER WHEELS.

American Ship Building Co.....Cleveland.
 Atlantic Works.....East Boston, Mass.
 Cramp, Wm. & Sons.....Philadelphia.
 Detroit Ship Building Co.....Detroit.
 Fore River Shipbuilding Co.....Quincy, Mass.
 Great Lakes Engineering Works.....Detroit.
 Hyde Windlass Co.....Bath, Me.
 Jenks Ship Building Co.....Port Huron, Mich.
 Lockwood Mfg. Co.....East Boston, Mass.
 Macbeth Iron Co.....Cleveland.
 Milwaukee Dry Dock Co.....Milwaukee.
 Newport News Ship Building Co.....Newport News, Va.
 Phosphor Bronze Smelting Co., Ltd.....Philadelphia.
 Roelker, H. B.....New York.
 Sheriffs Mfg. Co.....Milwaukee.
 Superior Ship Building Co.....Superior, Wis.
 Thropp & Sons Co., J. E.....Trenton, N. J.
 Trout, H. G.....Buffalo.
 United States Ship Building Co.....New York.

PROJECTORS, ELECTRIC.

General Electric Co.....Schenectady, N. Y.
 Westinghouse Electric & Mfg. Co.....Pittsburg, Pa.

PUMPS FOR VARIOUS PURPOSES.

Blake, Geo. F., Mfg. Co.....New York.
 Great Lakes Engineering Works.....Detroit.
 Kingsford Foundry & Machine Works.....Oswego, N. Y.

PUNCHES, RIVETERS, SHEARS.

Allen, John F.....New York.

RANGES.

Russell & Watson.....Buffalo.

REFRIGERATING APPARATUS.

Great Lakes Engineering Works.....Detroit.
 Roelker, H. B.....New York.

REGISTER FOR CLASSIFICATION OF VESSELS.

Great Lakes Register.....Cleveland.
 Record of American & Foreign Shipping.....New York.

REPAIRS—ENGINE AND BOILER.

(See also Boiler Manufacturers and Engine Builders.)

Georgian Bay Engineering Works.....Midland, Ont.
 Forest City Boiler Co.....Cleveland.

RIVETING MACHINES.

Allen, John F.....New York.

RIVETS, STEEL FOR SHIPS AND BOILERS.

Bourne-Fuller Co.....Cleveland, O.

SAFETY VALVES.

American Steam Gauge & Valve Mfg. Co.....Boston.
 Ashton Valve Co.....Boston.
 Crane Co.....Chicago.
 Lunkenheimer Co.....Cincinnati.

SAIL MAKERS.

Baker, Howard H. & Co.....Buffalo.
 Upson-Walton Co.....Cleveland.
 Wilson & Silsby.....Boston.

SALVAGE COMPANIES.

See Wrecking Companies.

SCHOOLS—NAVIGATION.

Chicago Nautical School.....Chicago.

SEARCH LIGHTS.

General Electric Co.....Schenectady, N. Y.
 Westinghouse Electric & Mfg. Co.....Pittsburg, Pa.

SHEARS.

See Punches, Rivets, and Shears.

SHIP AND BOILER PLATES AND SHAPES.

Bourne-Fuller Co.....Cleveland, O.
 Otis Steel Co.....Cleveland.

SHIP BUILDERS.

American Ship Building Co.....Cleveland.
 Atlantic Works.....East Boston, Mass.
 Bertram Engine Works Co., Ltd.....Toronto, Can.
 Buffalo Dry Dock Co.....Buffalo.
 Cramp, Wm. & Sons.....Philadelphia.
 Craig Ship Building Co.....Toledo, O.
 Chicago Ship Building Co.....Chicago.
 Detroit Ship Building Co.....Detroit.
 Fore River Shipbuilding Co.....Quincy, Mass.
 Great Lakes Engineering Works.....Detroit.
 Jenks Ship Building Co.....Port Huron, Mich.
 Lockwood Mfg. Co.....East Boston, Mass.
 Manitowoc Dry Dock Co.....Manitowoc, Wis.
 Milwaukee Dry Dock Co.....Milwaukee.
 Newport News Ship Building Co.....Newport News, Va.
 Roach's Ship Yard.....Chester, Pa.
 Shipowner's Dry Dock Co.....Chicago.
 Smith & Son, Abram.....Algonac, Mich.
 United States Ship Building Co.....New York.
 Willard, Chas. P. & Co.....Chicago.

SHIP CHANDLERS.

Baker, Howard H. & Co.....Buffalo.
 Marine Mfg. & Supply Co.....New York.
 Upson-Walton Co.....Cleveland.

SHIP DESIGNERS.

Kidd, Joseph.....Duluth.
 Kreer & Parsons.....Chicago.
 Matteson & Drake.....Buffalo.
 Rice & Lovejoy.....Buffalo.
 Steel, Nacey & Hynd.....Cleveland.
 Wood, W. J.....Chicago.

SHIP LANTERNS AND LAMPS.

Russell & Watson.....Buffalo.

SHIP TIMBER.

Martin-Barriss Co.....Cleveland.

SMOOTH-ON COMPOUND, FOR REPAIRS.

Smooth-On Mfg. Co.....Jersey City, N. J.

STAYBOLTS, IRON OR STEEL, HOLLOW OR SOLID.

Falls Hollow Staybolt Co.....Cuyahoga Falls, O.

STEAM VESSELS FOR SALE.

Gilchrist & Co., C. P.....Cleveland.
 Holmes, Samuel.....New York.
 Lester, S. S.....Quebec, Can.
 McCarthy, T. R.....Montreal, Can.

STEAMSHIP LINES, PASS. AND FREIGHT.

American Line.....New York.
 Anchor Line.....Buffalo.
 Boston Steamship Co.....Boston.
 Cleveland & Buffalo Transit Co.....Cleveland.
 Detroit & Cleveland Line.....Cleveland.
 Erie & Western Trans. Co.....Buffalo.
 Goodrich Trans. Co.....Chicago.
 International Mercantile Marine Co.....Philadelphia.
 Manitou Steamship Co.....Chicago.
 Mexican-American S. S. Co.....New Orleans, La.
 New York & Cuba Mail S. S. Co.....New York.
 Niagara, St. Catharines & Toronto Ry. & Nav. Co.....St. Catharines, Ont.
 Northern Michigan Trans. Co.....Chicago.
 Red Star Line.....New York.
 Richelleu & Ontario Nav. Co.....Montreal, Can.
 United Fruit Co.....Boston.

STEEL CASTINGS.

Macbeth Iron Co.....Cleveland.
 Otis Steel Co.....Cleveland.

STEERING APPARATUS.

American Ship Building Co.....Cleveland.
 Chase Machine Co.....Cleveland.
 Dake Engine Co.....Grand Haven, Mich.
 Detroit Ship Building Co.....Detroit.
 Hyde Windlass Co.....Bath, Me.
 Jenks Ship Building Co.....Port Huron, Mich.
 Marine Mfg. & Supply Co.....New York.
 Moulton Steering Engine Co.....New York.
 Pawling & Harnischfeger.....Milwaukee.
 Sheriffs Mfg. Co.....Milwaukee.

SUBMARINE DIVING APPARATUS.

Morse & Son, A. J.....Boston.
 Schrader's Son, A.....New York.

SURVEYORS, MARINE.

Gaskin, Edward.....Buffalo.
 Hynd, Alexander.....Cleveland.
 Lovejoy, H. O.....Buffalo.
 Matteson & Drake.....Philadelphia.
 Parker Bros. Co., Ltd.....Detroit.
 Nacey, James.....Cleveland.
 Rice, Henry.....Buffalo.
 Steel, Adam.....Cleveland.
 Wood, W. J.....Chicago.

TESTS OF MATERIALS.

Hunt, Robert W. & Co.....Chicago.
 Pittsburg Testing Laboratory, Ltd.....Pittsburg.

TILING, INTERLOCKING RUBBER.

New York Belting & Packing Co.....New York.

TOOLS, METAL WORKING, FOR SHIP AND ENGINE WORKS.

Allen, John F.....New York.
 Watson-Stillman Co.....New York.

TOOLS, WOOD WORKING.

Atlantic Works, Inc.....Philadelphia.

TOWING MACHINES.

American Ship Windlass Co.....Providence, R. I.
 Chase Machine Co.....Cleveland.

TOWING COMPANIES.

Donnelly Salvage & Wrecking Co.....Kingston, Ont.
 Great Lakes Towing Co.....Cleveland.
 Midland Towing & Wrecking Co., Ltd.....Midland, Ont.

TRAPS, STEAM.

Kieley & Mueller.....New York.
 Lunkenheimer Co.....Cincinnati.
 Sturtevant Co., B. F.,.....Hyde Park, Mass.

TRUCKS.

Boston & Lockport Block Co.....Boston.

TUBING, SEAMLESS.

Shelby Steel Tube Co.....Pittsburg, Pa.

Buyers' Directory of the Marine Trade.—Continued.

VALVES, STEAM SPECIALTIES, ETC.

American Steam Gauge & Valve Mfg. Co. Boston.
Ashton Valve Co. Boston.
Crane Co. Chicago.
Jenkins Bros. New York.
Kieley & Mueller New York.
Lunkenheimer Co. Cincinnati.
Ross Valve Co. Troy, N. Y.

VALVES FOR WATER AND GAS.

Ross Valve Co. Troy, N. Y.

VARNISHES. *

Detroit Varnish Co. Detroit.
Detroit White Lead Works. Detroit.
New Jersey Zinc Co. New York.
Also Ship Chandlers.

VENTILATING APPARATUS FOR SHIPS.

Sturtevant, B. F. Co. Hyde Park, Mass.

VESSEL AND FREIGHT AGENTS.

Boland, John J. Buffalo.
Brown & Co. Buffalo.
Elphicke, C. W. & Co. Chicago.
Fleming & Co., P. H. Chicago.
Gilchrist & Co., C. P. Cleveland.
Hall & Root Buffalo.
Helm & Co., D. T. Duluth.

VESSEL AND FREIGHT AGENTS—Con.

Hawgood & Co., W. A. Cleveland.
Holmes, Samuel New York.
Hutchinson & Co. Cleveland.
Lester, S. S. Quebec, Can.
McCarthy, T. R. Montreal.
Mitchell & Co. Cleveland.
Parker Bros. Co., Ltd. Detroit.
Prindiville & Co. Chicago.
Richardson, W. C. Cleveland.
Sullivan, D. & Co. Chicago.

WATER GAUGES.

Bonner & Co., Wm. T. Boston.
Lunkenheimer Co. Cincinnati, O.

WIRE ROPE AND WIRE ROPE FITTINGS.

Baker, H. H. & Co. Buffalo.
DeGrauw, Aymar & Co. New York.
Upson-Walton Co. Cleveland.

WHISTLES, STEAM.

American Steam Gauge & Valve Mfg. Co. Boston.
Ashton Valve Co. Boston.
Lunkenheimer Co. Cincinnati.

WINDLASSES.

American Ship Windlass Co., Providence, R. I.
American Ship Building Co. Cleveland.
Hyde Windlass Co. Bath, Me.
Jenks Ship Building Co. Port Huron, Mich.
Marine Mfg. & Supply Co. New York.

WINCHES.

American Ship Windlass Co., Providence, R. I.
Georgian Bay Engineering Works. Midland, Ont.
Hyde Windlass Co. Bath, Me.

WOOD WORKING MACHINERY.

Atlantic Works, Inc. Philadelphia.

WRECKING AND SALVAGE COMPANIES.

Donnelly Salvage & Wrecking Co. Kingston, Ont.
Great Lakes Towing Co. Cleveland.
Midland Towing & Wrecking Co., Ltd. Midland, Ont.
Parker Bros. Co., Ltd. Detroit.

YACHT AND BOAT BUILDERS.

Bertram Engine Works Co., Ltd. Toronto, Can.
Drein, Thos. & Son. Wilmington, Del.
Georgian Bay Engineering Works. Midland, Ont.
Truscott Boat Mfg. Co. St. Joseph, Mich.
Willard, Chas. P. & Co. Chicago.

YAWLS.

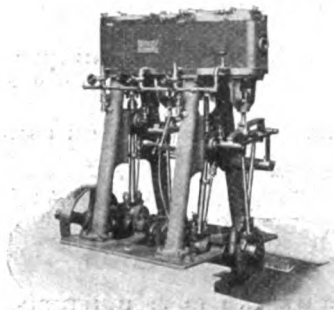
Drein, Thos. & Son. Wilmington, Del.

ALPHABETICAL INDEX OF ADVERTISERS IN THE MARINE REVIEW.

The star (*) indicates that the advertisement appears alternate weeks. For addresses see advertisements on pages noted.
The dagger (†) indicates that advertisement appears once a month.

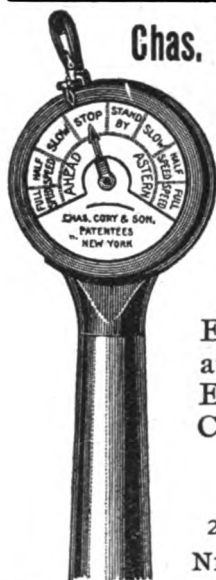
*Allen, John F. 3	Elphicke, C. W. & Co. 48	Lake Superior Contracting & Dredging Co. 46	Record of American & Foreign Shipping. 44
Almy Water Tube Boiler Co. 42	Erie & Western Trans. Co. 38	Lebanon Chain Works. 54	Red Star Line. 39
American Bureau of Shipping. 44		Lester, S. S. 48	*Reilly, Repair and Supply Co., Jas. 40
American Injector Co. 3		Lewis & Hughes. 9	Reliance Mfg. Co. 40
American Line. 39		Lockwood Mfg. Co. 41	Rice, Henry. 49
American Ship Building Co. 5	Falls Hollow Staybolt Co. 42	Lovejoy, H. O. 49	*Richardson, W. C. 48
American Ship Windlass Co. 2	Fisher Electrical Works. 40	L. S. & M. S. Ry. 55	*Ritchie & Sons, E. S. 47
American Steam Gauge Co. 35	Fitz-Simons & Connell Co. 46	Lunkenheimer Co. 54	Roberts Water-Tube Boiler Co. 11
Anchor Line. 56	Fix, S. S. Sons. 54		Roelker, H. B. 41
Armstrong Cork Co. 56	Fleming & Co., P. H. 48		Ross Valve Co. 54
Ashton Valve Co. 35	Fletcher, W. & A., Co. 41		Russell & Watson. 45
Atlantic Works. 41	Fogg, M. W. 2	McCarthy, T. R. 48	
*Atlantic Works, Inc. 8	Fore River Shipbuilding Co. 41	McCurdy, Geo. L. 44	Sadler, Perkins & Field. 49
	Forest City Boiler Co. 54	*McNab & Harlin Mfg. Co. 56	Safety Car Heating & Lighting Co. 8
	Frankfort M. A. & P. G. I. Co. 44	Macdonald, Ray G. 49	Scherzer Rolling Lift Bridge Co. 45
Babcock & Wilcox Co. 8		Manitowoc Dry Dock Co. 41	Schneider's Sons. 2
Baldt Anchor Co. 45	General Electric Co. 56	Manitowoc Steamship Co. 38	Shaw, Warren, Cady & Oakes. 49
Baker, Howard H., & Co. 50	*Georgian Bay Engineering Wks. 41	Marine Iron Co., Bay City, Mich. 47	*Shelby Steel Tube Co. 8
*Bertram Engine Works Co., Ltd. 41	Gilchrist, Albert J. 48	*Marine Mfg. & Supply Co. 40	Sherriffs Mfg. Co. 37
Blake, Geo. F., Mfg. Co. 45	Gilchrist & Co., C. P. 38	Martin-Barriss Co. 43	Shippowners' Dry Dock Co. 41
Boland, J. J. 48	Gouldrich Trans. Co. 48	Matteson & Drake. 40-49	Shipping World. 45
*Bonner & Co., Wm. T. 35	Great Lakes Engineering Works. 12	Mexican-American S. S. Co. 38	*Smith & Son, Abram. 47
*Boston & Lockport Block Co. 35	Goulding, Holding & Masten. 48	Midland Towing & Wrecking Co., Ltd. 55	Smith Co., L. P. & J. A. 46
Boston Steamship Co. 39	Great Lakes Register. 52	Mietz, Aug. 6	Smith Coal & Dock Co., Stanley B. 9
Bourne-Fuller Co. 35	*Great Lakes Towing Co. 5	Milwaukee Dry Dock Co. 4	Smith Premier Typewriter Co. 45
Bowers, L. M., & Co. 45		Mitchell & Co. 48	Smith, Stanley B., & Co. 9
Brown Hoisting Machinery Co. 2	Hall & Root. 48	Morse & Son, A. J. 54	Smooth-On Mfg. Co. 37
Inc. 2	Hanna, M. A., & Co. 47	Mosher Water-Tube Boiler Co. 43	*Standard Gauge Mfg. Co. 55
Buffalo Dredging Co. 46	Hawgood & Co., W. A. 48	Motor Boat and Sportsman's Show. 43	Starke Dredge & Dock Co., C. H. 46
Buffalo Dry Dock Co. 4	Helm & Co., D. T. 48	Moulton Steering Engine Co. 42	Steel, Adam. 49
	Hickler Bros. 46		Stirling Co. 9
*Camden Anchor-Rockland Machine Co. 11	Holmes, Samuel. 48	Nacey, James. 49	Stratford Oakum Co., Geo. 2
Chase Machine Co. 46	Holzappel's American Compositions Co. 45	Newport News Ship Building & Dry Dock Co. 6	Sturtevant, B. F., Co. 56
Chicago & Gt. L. Dredge & Dock Co. 41	Hoyt, Dustin & Kelley. 49	New Jersey Zinc Co. 11	Sullivan, M. 47
Chicago Nautical School. 4	Hunt, Robert W., & Co. 48	New York Belting & Packing Co. 3	Sullivan & Co. 48
Chicago Ship Building Co. 55	Hutchinson & Co. 56	New York & Cuba Mail S. S. Co. 39	Superior Ship Building Co. 4
Cleveland City Forge & Iron Co. 38	Hyde Windlass Co. 49	Niagara, St. C. & T. Ry. & N. Co. 38	
Cleveland & Buffalo Transit Co. 2	Hynd, Alexander. 49	Northern Mich. Trans. Co. 38	Taylor Water-Tube Boiler Co. 43
Continental Iron Works. 55		Northwestern Steam Boiler & Mfg. Co. 42	Thropp, J. E., & Sons Co. 54
Contractors' Supply & Equipment Co. 54	International Mercantile Marine Co. 39		Trout, H. G. 37
Cory, Chas. & Son. 5	Ironville Dock & Coal Co. 47		Truscott Boat Mfg. Co. 40
*Craig Ship Building Co. 7		Parker Bros. Co. 48	
Cramp, Wm. & Sons, S. & E. B. Co. 3	Jenkins Brothers. 56	Pawling & Harnischfeger. 42	Union Machine & Boiler Co. 47
*Crandall & Son, H. I. 43-44	Jenks Ship Building Co. 5	Peck, Chas. E. & W. F. 44	United Fruit Co. 38
Crane Co. 43-44		*Penberthy Injector Co. 8	Upson-Walton Co. 56
		Phosphor Bronze Smelting Co., Ltd. 40	
D. & C. Line. 38	Kahnweiler's Sons, David. 40	Pickands, Mather & Co. 47	Victor Metals Co. 2
Dake Engine Co. 42	Katzenstein, L., & Co. 40	Pittsburg Coal Co. 9	
Dearborn Drug & Chemical Wks. 11	Kidd, Joseph. 49	Pittsburg Testing Laboratory, Ltd. 49	Walker, Thomas, & Son. 35
DeGrauw, Aymar & Co. 47	*Kieley & Mueller. 35	Potter & Potter. 49	Ward Line. 39
Delauney, Belleville & Co. 36	Kingsford Foundry & Machine Works. 42	Potter, J. D. 40	*Watson-Stillman Co. 55
Delaware River Iron S. B. & E. Works. 41	Kreer & Parsons. 49	Powell, Ambrose V. 49	Westinghouse Electric & Mfg. Co. 43
Detroit Ship Building Co. 5	Kremer, C. E. 48	Prindiville & Co. 48	White, Johnson, McCaslin & Cannon. 48
Dixon Crucible Co., Joseph. 54			*Willard, Chas. P. & Co. 35
Donnelly Salvage & Wrecking Co. 44			Wood, W. J. 49
Drein, Thos., & Son. 40			
Dunbar & Sullivan Dredging Co. 46			

John E. Thropp & Sons Co., TRENTON, N. J.



Builders of Single, Compound, Triple-Expansion and Direct Connected Engines.

Boyer Sectional Water Tube boilers and machinery complete for light draft Passenger Boats, Yachts, Tugs, Etc.



Chas. Cory & Son,

Manufacturers of
Mechanical
and
Electrical
Telegraphs
and
Indicators.

Engine Bells
and
Electric
Call Bells.

278-279 Division St.
NEW YORK CITY.

A. J. MORSE & SON.
DIVING APPARATUS
140
CONGRESS ST. BOSTON.

ORAM FIX. ESTABLISHED 1880. J. W. FIX.
S. FIX'S SONS,
SUCCESSORS TO S. FIX & SON
Steam Flue Welding Works
Our Work Stands Government Test.
Our Welds are Perfectly Smooth.
Write us for Prices.
COR. LEONARD
AND WINTER STS. **Cleveland, O.**

DIXON'S Pure Flake GRAPHITE

As a Cylinder Lubricant

Makes cylinders, valve and rods glassy, smooth and bright. Reduces friction. Saves packing.

Send for our booklet
"Graphite as a Lubricant."

JOSEPH DIXON CRUCIBLE CO.,
Jersey City, N. J.

**WATER
FILTERS
REGULATORS
& ENGINES**

We make **Pressure Regulating Valves** for all purposes, steam or water.

Our **Feed-Water Filter** will keep oil out of your boiler.

We can interest you if you use a condenser.

Water Engines for Pumping Organs



Keep Oil out of your Boiler with the
FEED-WATER FILTER
For Marine and Land Service
Two of these Filters are in use on the Oceanic.

THE ROSS VALVE CO. TROY N. Y.

LUNKENHEIMER
"CLIP" GATE VALVES

Iron Body Brass Mounted, and All Iron. Single Disc, Double Seated. Take pressure from either end. Compact, Durable, Low-priced. Unequaled for all ordinary pressures. In screw ends, 1/2 to 6 inches. In flange ends, 2 to 6 inches. Specify *Lunkenheimer* and order from your dealer. Write for catalog.

The Lunkenheimer Co.
Largest Manufacturers of Engineering Specialties in the World, CINCINNATI, OHIO, U. S. A.

LEBANON CHAIN WORKS,
LEBANON PA.

Manufacturers of HAND MADE CHAINS of all grades.
SHIPS' CABLES, DREDGE CHAINS, CRANE CHAINS, BLOCK CHAINS.
Large chains furnished side or end welded. High grade tested chains a specialty.
We manufacture our own iron. We are licensed testers for Lloyds Association, American Bureau of Shipping and Bureau Veritas.

Hand Book of Admiralty Law

By ROBT. M. HUGHES.

\$3.75.

Marine Review,

Cleveland, O.

John D. Gilchrist, Pres. John Marron, Sec'y.
John A. Flajole, Gen'l Mgr.

THE FOREST CITY BOILER CO.

Marine Work a Specialty.

264 Merwin St. Tel. Main 1886
CLEVELAND, OHIO.

STEEL SHIPS: Their Construction and Maintenance.

A manual for ship builders, ship superintendents, students and marine engineers.

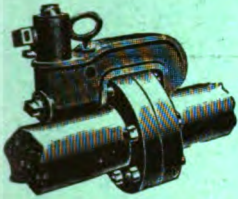
BY THOMAS WALTON.

Price \$5.50.

The Marine Review, Cleveland, O.



WATSON-STILLMAN HYDRAULIC JACKS



We have the experience, ample equipment and facilities to build any kind or class of Hydraulic Tool you may need, no matter what it may be. Our regular line is the most complete in the United States, embracing Pumps, Presses, Punches, Shears, Benders, Valves, Accumulators, Gauges and nearly 300 styles of Hydraulic Jacks.

Let us send you our Illustrated General Index No. 65, Edition "77."



WATSON-STILLMAN CO.,

Offices:

46 Dey Street. NEW YORK.
453 The Rookery, CHICAGO.

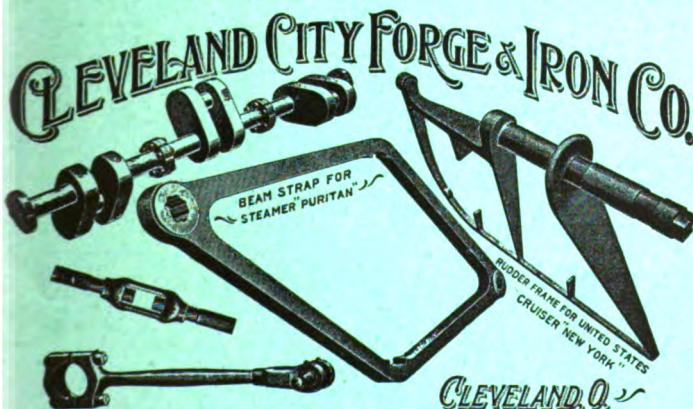
Works: Aldene, Union Co., N. J.

JAMES PLAYFAIR, { Pres't and
Gen. Mgr. D. L. WHITE, Vice President.
J. W. BENSON, Secretary and Treasurer.

MIDLAND TOWING and WRECKING CO., Ltd.

MIDLAND, ONT., CANADA.

FIRST-CLASS TUGS FOR WRECKING,
RAFT TOWING, Etc., STEAM PUMPS,
DIVERS, JACKS, HAWSERS, LIGHTERS.



IRON OR STEEL FORGINGS FINISHED COMPLETE, ROUGH MACHINED OR SMOOTH FORGED ONLY, OF ANY WEIGHT.
COUPLING LINKS AND PINS. PRESSED WROUGHT IRON TURNBUCKLES. CAR IRON SPECIALTIES.

Smith Concrete Mixer

For Foundations--Floors--Any
Kind of Concrete Work

Write for Catalogue



Six Sizes

Any combination of Power and Mounting

Contractors' Supply & Equipment Co.
Chicago

LAKE SHORE AND MICHIGAN SOUTHERN RY.

Eastward	Arrive from West	Depart East
No. 18, Southwestern Limited		*1:50 a.m.
No. 22, Lake Shore Limited	*2:12 a.m.	*2:20 a.m.
No. 20, Chicago and Cleveland Exp.	*7:20 a.m.	
No. 28, New York and Boston Exp.	*7:40 a.m.	*8:00 a.m.
No. 40, Toledo and Buffalo Accom.	†10:00 a.m.	†10:30 a.m.
No. 32, Fast Mail	*11:25 a.m.	*11:30 a.m.
No. 48, Accommodation via Sandusky	†1:40 p.m.	
No. 42, Boston-New York Express		*11:45 a.m.
No. 44, Cleveland and New York Spl.		*3:00 p.m.
No. 46, Southwestern Express		*3:10 p.m.
No. 116, Ashtabula Accommodation		†4:30 p.m.
No. 6, Limited Fast Mail	*5:40 p.m.	*5:45 p.m.
No. 26, 20th Century Limited	*7:40 p.m.	*7:43 p.m.
No. 10, Chicago, N.Y. & Boston Spl.	*7:30 p.m.	*7:50 p.m.
No. 16, New England Express	*10:30 p.m.	*10:35 p.m.
No. 2, Day Express	†9:10 p.m.	†9:25 p.m.
No. 126, Norwalk Accommodation	†7:55 a.m.	
Westward	Arrive from East	Depart West
No. 7, Exposition Limited	*12:50 a.m.	
No. 11, Southwestern Limited	*2:55 a.m.	
No. 9, Day Express		†6:10 a.m.
No. 15, Boston and Chicago Special	*3:10 a.m.	*3:15 a.m.
No. 19, Lake Shore Limited	*7:15 a.m.	*7:25 a.m.
No. 23, Western Express	*10:30 a.m.	*10:35 a.m.
No. 29, Southwestern Special	†11:10 a.m.	
No. 33, Southwestern Express	*12:25 p.m.	
No. 133, Cleveland and Detroit Exp.		*12:45 p.m.
No. 47, Accommodation	†11:00 a.m.	†3:00 p.m.
No. 141, Sandusky Accommodation		†3:10 p.m.
No. 43, Fast Mail	*4:35 p.m.	*4:40 p.m.
No. 127, Norwalk Accommodation		†5:10 p.m.
No. 37, Pacific Express	*6:50 p.m.	*7:20 p.m.
No. 3, Fast Mail Limited	*10:50 p.m.	*10:55 p.m.
No. 115, Ashtabula Accommodation	*8:30 a.m.	

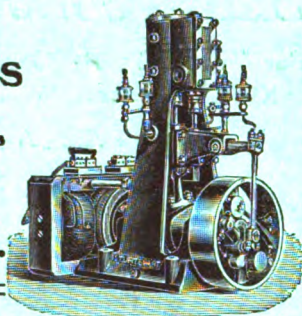
*Daily. †Except Sunday. ‡Except Monday.
Trains Nos. 23, 28 and 37 run via Erie Station.
City Ticket Office, 237 Superior St

STURTEVANT

MOTORS and GENERATORS

In a full line of Sizes
up to

125 H. P. & 100 K. W.



GENERATING SETS 35 DIFFERENT SIZES
From 1½ to 100 K. W.

ELECTRIC FANS

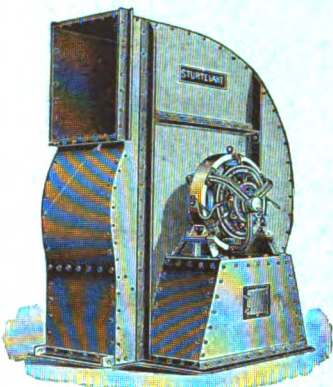
of standard or special
design to meet any
requirements.

**B. F. STURTEVANT
COMPANY,**

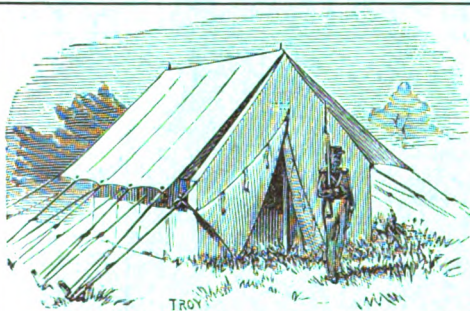
BOSTON, MASS.

General Office and Works:
HYDE PARK, MASS.

New York. Philadelphia.
Chicago. London.



(283)

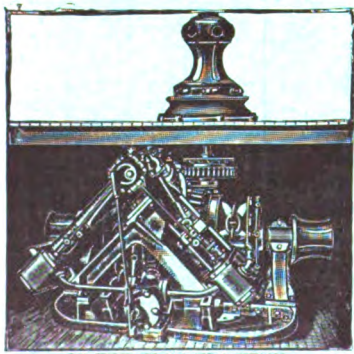


TENTS,
SAILS,
AWNINGS
AND
BUNTING
of every
Description.

We are among the largest manufacturers in the country of
canvas goods.

The UPSON-WALTON Co.,
CLEVELAND, O.

WINDLASSES AND CAPSTANS



HYDE WINDLASS COMPANY,

BATH MAINE.

The Hyde Steam and
Power Windlasses and
Capstans are the best
in the market.

They have been selected
for most of the vessels now
building for the Navy De-
partment, Revenue Ma-
rine, Light-house Board
and United State
Coast Survey

They are being furnished
for the majority of the
highest class Steam Ships,
Merchant Vessels and
Yachts now building.

Jenkins Bros. Valves



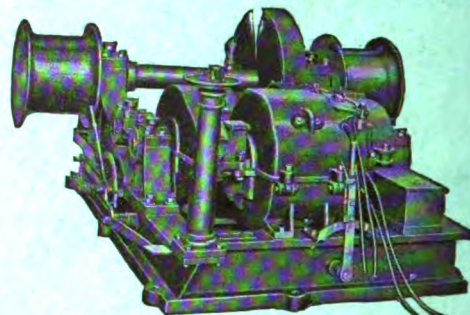
The manufacturers have one
aim constantly in view—that of
giving the user the best valve
that can be produced, regardless
of expense. It is their specialty,
and every precaution is used to
have their valves as near per-
fection as possible.

Write for booklet: "Valve Troubles
and How to Avoid Them."

Jenkins Bros.,

NEW YORK, BOSTON, PHILADELPHIA,
CHICAGO, LONDON.

GENERAL ELECTRIC COMPANY.



Deck Winch connected to General Electric Motor.

GENERAL OFFICE: SCHENECTADY, N. Y.

Cleveland Office, **CITIZENS BUILDING.**

Sales Offices
in all Large Cities

Marine Repairs AND Castings

The Macbeth Iron Company,
CLEVELAND, OHIO,

LIFE PRESERVERS—BUOYS.

Acme. Solid Cork. Granulated Cork. Each Preserver stamped by U. S. In-
spector guaranteeing proper buoyancy. Cork Filled Yacht Fenders. Cork
Mooring Buoys. Material and Finish Guaranteed. Orders filled promptly.

ARMSTRONG CORK COMPANY.

Boston. New York. Philadelphia. Pittsburg. Chicago.
St. Louis. Baltimore.

Howard H. Baker & Co., SHIP CHANDLERS and SAIL MAKERS

18 to 26 Terrace,

BUFFALO, N. Y.